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Director's Room

ICT INITIATIVES QUALITY IMPROVEMENT IN ELEMENTARY EDUCATION

Distance Education Programme
Sarva Shiksha Abhiyan (DEP-SSA)
MHRD-IGNOU, Govt. of India Project

सर्व शिक्षा अभियान
सब पढ़ें सब बढ़ें

IGNOU

केंद्रीय शैक्षिक प्रौद्योगिकी संस्थान

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्, नई दिल्ली

Central Institute of Educational Technology

National Council of Educational Research and Training, New Delhi

11वाँ अखिल भारतीय श्रव्य एंव दृश्य उत्सव

11th All India Children's Educational Audio-Video Festival

प्रमाण-पत्र /CERTIFICATE

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सब पढ़ें सब बढ़ें

ICT Initiatives

Quality Improvement in Elementary Education

Editor

S.V.S. Chaudhary

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FOREWORD

The Ministry of Human Resource Development (MHRD), Govt. of India is giving due emphasis to 'Education For All' under Sarva Shiksha Abhiyan (SSA) project, which is being implemented by MHRD in collaboration and partnership with the State Governments. This major initiative involves a fairly large cross section of our society consisting of students, teachers and other functionaries. It is, therefore, important that we evolve dynamic systems with extensive reach to provide value addition to education, effective and continuous knowledge upgradation and training of teachers and other functionaries. It is clear that success of such initiatives depends heavily on effective training of large target groups of learners in the vicinity of their dwellings and work places. It is in this background that the MHRD decided to give a major responsibility to IGNOU, which has already emerged as one of the world leaders in distance education, in the form of DEP-SSA, a National Project to meet the educational and training requirements of SSA through Open and Distance Learning (ODL) mode.

IGNOU has developed enormous ICT capabilities, which are being extensively used for providing flexible and learner-centric education. The launch of EDUSAT, a dedicated satellite for education by ISRO in the year 2004 has further strengthened our capability and reach. We are also looking forward to additional ICT capabilities in the form of state networks for tele-education. We understand that an effective inter-phase of face-to-face and ODL system will enable us to achieve the goal of Universalisation of Elementary Education (UEE) in a time-bound manner.

It is well understood that quality of education depends directly on the quality of teachers, their knowledgebase, their motivation, their professional competency and commitment. In order to induce these crucial factors in teachers as they work, we need effective applications of ICT to provide them the desired inputs as per their convenience and location.

The learned contributions made by teachers/teacher educators and other scholars, in this publication greatly highlight and authenticate the important role and potential of ICT for achieving the foregoing objectives and goals. I am confident that this document would reinforce our commitment towards attaining the cherished goal of UEE and encourage further professional development of teachers and other functionaries.

I congratulate Prof. S.C. Garg, Pro Vice-Chancellor, IGNOU, Prof. SVS Chaudhary, Project Director, DEP-SSA and members of his team for organizing the national seminar and brining out this publication for wider use by teachers and other functionaries associated with UEE all over India. I would also like to record our thanks to the Department of Elementary Education and Literacy, MHRD, Govt. of India for sponsoring the national seminar. We look forward to more such deliberations under DEP-SSA programme, which could result in more such publications.

(H.P. Dikshit)
Vice-Chancellor, IGNOU
&
Chairman, DEP-SSA

December, 2005
New Delhi

PREFACE

Use of Information and Communication Technologies (ICTs) has added a new dimension to the teaching-learning process. Teachers have now access to a variety of ICT, which provides unmatched opportunities for simulation of reality within controlled instructional settings. Teachers can now easily facilitate the process of learning by building awareness on contextual issues, help children learn the concepts, acquire theoretical knowledge about curriculum areas and also provide individualized instruction to learners. Computer enabled learning is an emerging medium to support further learning as well as self-directed learning. States have created their web sites with features like curriculum database, bulletin board, inter-connectivity, calendar of events, collaborative projects, target audience and beneficiaries. Obviously, ICT has enabled distance education to function as a change agent in academic pursuits. This would not only strengthen quality improvement initiatives at all levels but also reduce regional and social disparities in education.

Distance Education Programme (DEP) under Sarva Shiksha Abhiyan has provided a new thrust on building effective learning environments by addressing aspects of quality in the context of in-service training needs of elementary school teachers and other functionaries and bridging the gaps through specially designed/developed courses. DEP-SSA was established by MHRD as a national centre for distance learning through a well-designed interface between the face-to-face and the distance modes. DEP-SSA helps in the development of teaching-learning materials (self-learning print materials) in curricular and contextual areas, materials for teleconferencing, audio-video materials, broadcast cassettes and CDs and interactive multi-media CDs for master trainers, panelists etc. It strengthens institutions through installation of Direct Reception Sets (DRS) for providing down linking facilities at State Councils of Educational Research and Training (SCERTs), District Institutes of Education and Training (DIETs) and State Project Offices in all States/UTs. The gamut of the programmes under DEP-SSA is multifarious, need-based and field-tested for replication and wider application. Good educational and innovative practices relevant to elementary schools are promoted, documented and disseminated by DEP-SSA.

DEP-SSA has also been providing a platform for further empowerment of teacher educators of DIETs and educationists so that their experimentation in new ways of learning could be documented and disseminated to stakeholders. On March 29-30, 2005, DEP-SSA organized at its IGNOU campus a two-day National Seminar on ICT Initiatives for Quality Improvement at Elementary Stage of Education. The underlying objectives of this seminar was to promote the use of ICT for making quality education accessible to all, particularly to the disadvantaged groups, provide interface and integration of face-to-face and distance modes of transactional processes in classroom environment and workout strategies for content generation and share it with others to improve professional competency of elementary school teachers and other functionaries associated with SSA.

The present document consists of 15 papers selected on the basis of their academic merit and relevance of their subject matter to ICT. The introductory chapter provides a synoptic overview of these papers. The ICT based themes of these papers are impact of computer-aided learning on quality of education, scope of ICT for quality control in classroom; new paradigm of learning and ICT interface, use of HTML for development of multimedia contents and ICT-enabled teacher education programmes. A few case studies too have been included in this document.

I would like to express my gratitude to the Department of Elementary Education and Literacy, Ministry of Human Resource Development, Government of India for sponsoring DEP under Sarva Shiksha Abhiyan (DEP-SSA) to strengthen and support in-service training of elementary school teachers. I thank Prof. H.P. Dikshit, Vice-Chancellor, IGNOU and Chairman, Advisory Committee, DEP-SSA and Prof. S.C. Garg, Pro-Vice-Chancellor, IGNOU who provided necessary administrative and academic guidance for smooth conduct of the seminar. I am also thankful to all the participants without whose cooperation this publication would not have seen the light of the day. My thanks are also due to the organizations that deputed their faculty to this seminar.

I express my sincere gratitude to Prof. V.P. Garg, erstwhile Consultant, DEP-SSA, who took up the onerous responsibility of organizing this seminar as a programme coordinator on behalf of DEP-SSA and also made available his services for content editing of the papers and supervised technical aspects of its publication. I express my thanks to other faculty members who provided necessary support and to Shri Chandra Ballabh, Administrative-cum-Finance Officer and supporting staff in organizing the seminar and publishing this book.

I hope this publication will be useful to all devoted to the cause of quality improvement of elementary education. I solicit school teachers and teacher educators to replicate the case studies documented here. This is how elementary education can change and educational reform institutionalized. I feel this is the right time to acknowledge that educational ICT in India has come of age and teachers and teacher educators can now give that decisive push to ensure that quality elementary education strikes roots in our soil.

December, 2005
New Delhi

(S.V.S. Chaudhary)
Project Director
DEP-SSA, IGNOU
New Delhi

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ABBREVIATIONS

AIE	Alternative Innovative Education
AS	Alternative Schooling
BOOT	Build, Own, Operate and Transfer
BRCC	Block Resource Centre Coordinator
BRC	Block Resource Centre
BRG	Block Resource Group
CAE	Computer-Aided Education
CAL	Computer-Aided Learning
CATV	Cable Television
CBSE	Central Board of Secondary Education
COL	Commonwealth of Learning
CRCC	Cluster Resource Centre Coordinator
CRC	Cluster Resource Centre
CSILE	Computer Supported International Learning Environments
DEP	Distance Education Programme
DEP-DPEP	Distance Education Programme–District Primary Education Programme
DEP-SSA	Distance Education Programme-Sarva Shiksha Abhiyan
DIET	District Institute of Education and Training
DRG	District Resource Group
DTH	Direct Transmission to Home
EDC	Education Development Centre
EduSat	Education Satellite
EFA	Education for All
EGS	Education Guarantee Scheme
ET	Educational Technology
EVS	Environmental Studies
HTML	Hyper Text Mark-up Language
IASE	Institute of Advanced Study in Education
ICDS	Integrated Child Development Scheme
ICT	Information and Communication Technology
IEA	International Association for Evaluation of Educational Achievement
IGNOU	Indira Gandhi National Open University
IRI	Interactive Radio Instruction
ISRO	Indian Space Research Organization

MHRD	:	Ministry of Human Resource Development
MLL	:	Minimum Levels of Learning
MMP	:	Multi-Media Package
MOU	:	Memorandum of Understanding
MTA	:	Mother Teacher Association
NCERT	:	National Council of Educational Research and Training
NCTE	:	National Council for Teacher Education
NGO	:	Non-Governmental Organization
NIEPA	:	National Institute of Educational Planning and Administration
NPGEL	:	National Programme of Girls Education at Elementary Level
ORS	:	Oral Rehydration Solution
PC	:	Personal Computer
PTA	:	Parent Teacher Association
SCERT	:	State Council of Educational Research and Training
SHG	:	Self-Help Group
SSA	:	Sarva Shiksha Abhiyan
TFG	:	Task Force Group
TLM	:	Teaching-Learning Material
UEE	:	Universalisation of Elementary Education
UNESCO	:	United Nations Educational Scientific and Cultural Organization
USAID	:	United States Agency for International Development
VCD	:	Video Compact Disc
VEC	:	Village Education Committee

CHAPTER 1

ICT INITIATIVES FOR QUALITY ELEMENTARY EDUCATION

1.0 Introduction

The National Policy on Education (1986) and the Programme of Action (1992) laid emphasis on achieving universalization of elementary education in a time bound manner. Sarva Shiksha Abhiyan is a response to the demand for quality elementary education all over the country. SSA provides an opportunity for improving capabilities of all children, through a variety of media and methods.

Constructivists learning theory implies that children bring rich experiences to classroom. Teachers can help them construct new knowledge and skills. ICT can facilitate both the teachers and the children construct new knowledge or experiences and thus can strengthen the learning process.

ICT offers enormous potential to impart quality education, remove illiteracy, provide educational opportunities to those hitherto unreached, reduce imbalances among regions and social groups and train teachers. The convergence of telecommunications, audio-video and computers has a tremendous potential to revolutionize education and transform the teaching-learning process. ICTs provide flexibility in terms of the place and pace of learning, time of learning, selection and combinations of subjects, delivery system, and interaction with experts..

1.1 ICT initiatives – A National Seminar

With a view to promote equity and excellence in elementary education DEP-SSA, IGNOU organized a two-day National Seminar on "ICT Initiatives for Quality Improvement at Elementary Stage of Education" at IGNOU campus on 29-30 March 2005 with the following objectives:

- To promote the use of ICT for making quality education accessible to all, particularly to the disadvantaged groups,
- To provide interface and integration of face-to-face and distance modes of transactional processes in the classroom environment, and
- To workout strategies for content generation and share these to improve the professional competency of elementary school teachers and other functionaries associated with SSA.

1.2 Nature of Participation

Wide publicity for the national seminar was given through direct correspondence with State Project Directors of Sarva Shiksha Abhiyan; Principals of Institute of Advanced Study in Education (IASEs); Principals of Regional Institutes of Education (RIEs) at Ajmer, Bhopal, Bhubaneswar, Mysore; Directors of State Councils of Educational Research and Training (SCERTs); Principals of District Institutes of Education and Training (DIETs); Chairperson, National Council for Teacher Education (NCTE) and Deputy Secretary, Technical Support Group, Ed.Cil, Government of India. As a result of these measures, DEP-SSA received many papers on the seminar theme from faculty members of these institutions.

1.3 Number of Entries

After due scrutiny by the external academicians (members of the Screening Committee constituted for this purpose), 20 out of 29 papers were selected for presentation in the two-day seminar. The authors were asked to revise their papers according to the observations/comments made during the seminar. This document comprises 14 papers selected on their academic merit and relevance of the subject matter to the theme of the seminar. The list of the contributors is given in **Annexure-I.** These 14 papers include six case studies on the effectiveness of ICT applications. Two papers are in Hindi, for users of the document, an abstract of each of these two papers has been given in English.

1.4 Overview of Papers

Recent studies have indicated that the best predictor of the skills that teacher education graduates have in infusing information technology (IT) into instruction is use of IT in course work throughout their pre-service programme (Radha Mohan, 2004). It serves as a production as well as dissemination medium. In today's competitive environment, professionals and managers performing any function in an organization need and use information related to their tasks. This is true of teachers as well as teacher educators. Satellite communication and computer account for this difference. ICT has revolutionalised the life-style of the people. Internet has people yearn for and seek more knowledge. This is the need of the knowledge-based economy, which is market-oriented and competitive. Performance is the buzzword. Those who act on it, survive, thrive and dominate, while they who are indifferent to it are sure to fall behind.

The overview of selected 14 papers is divided into two sections. The first section deals with theoretical postulates, importance, scope and case for ICT applications in educational institutions while the second section presents a comprehensive overview of six case studies.

Section I

Impact of Computer-Aided Learning on Quality of Education

Baghel and Nagpal in their paper analyze the format of a proposed case study on '*Impact of computer aided learning on quality of education*'. Three key issues raised by them are:

i) Is computer-aided learning (CAL) the same as computer education?
ii) How can computer-aided learning improve quality of education?
iii) Can CAL be counter productive, confusing and mind distracting?

Authors attempt to distinguish between CAL and computer education. Computer education according to them is not computer aided learning if a school is provided with six to eight computers in an air-conditioned lab with a computer instructor/teacher with a degree in computer science and a few computer books prescribed in the course that covers MS Office, Internet etc. It is rather computer education. In computer education the objective is acquisition of computer skills and expertise. Computer-aided learning requires just one computer in the classroom along with multimedia projector or big screen T.V and software containing relevant knowledge base for the targeted group of children. There may not be a computer in the classroom and yet a teacher may use computer-aided learning. Authors argue that the overall quality of learning improves in computer-aided learning because

i) Presentation style of computer-aided learning material is better than that of traditional books;

ii) It saves time as it keeps the children busy in the learning process and reduces time wasted by pauses during teaching;

iii) It makes learning interesting; and

iv) It enables continuous up gradation in the teaching learning process.

Scope of ICT for Quality Control in the Classroom

Panda and Basantia analyze the scope of ICT for quality control in the classroom. It is visualized that ICT will provide several benefits to the learner and the teacher. These include shared learning resources, shared learning space, promotion of collaborative learning and progress towards autonomous learning. It is argued by them that greater use of ICT in the classroom will change the role of the teacher. Identification, classification and authentication of electronic information sources will then be critical new tasks for teachers. The authors highlight contribution of ICT to quality in teaching-learning and evaluation processes. Cognition level, pedagogies, convergence, alignment, data management and culture can be considered as the major parameters, through which ICT can contribute to quality in teaching learning and evaluation.

New Paradigm of Learning and ICT Interface

Information and communication technology is creating a new paradigm of learning. *Senapaty* discusses the potential of new technologies, particularly digital technology as a learning tool. However, classroom knowledge is presented to the children in a linear, didactic manner that differs dramatically from the children's previous experience outside the school. School has to take cognizance of the national change brought about through the increasing flow of information, technology, products, capital and people between nations. The author compares the traditional learning process with the new paradigm of the learning process. The new paradigm of the learning process is (i) natural, (ii) involves social processes (iii) based on active processes (iv) including both linear and non-linear processes. As such, there is an urgent need for the professional development of teachers to enable them to their professional experiences while gaining competency in mastery of teaching-learning process. He emphasizes that it is learning with, not from or about technology, that makes computer-based technology an important tool in a new paradigm of learning.

Use of HTML for Development of Multimedia Content

Madhavan and Roy in their paper analyze the necessity of developing multimedia content generation using HTML (a programming language). HTML stands for Hyper Text-Mark-up Language. It is a structured mark-up language that is used to create web pages. HTML is nothing but a collection of codes termed as elements that are used to indicate the structure and format of a document. The authors have developed an HTML document for developing multimedia content on an interactive CD to teach a lesson on 'water' for Class VI children using Mantra technology to submit or receive online instant translation. It can be helpful in content sharing as well.

Potentials of ICT for Elementary Education

Gupta examines the potentials of ICT for elementary education. This relates to training and appraisal, need assessment, empowerment of state functionaries (facilitators, resource persons, SCERT personnel, State Board personnel, DIET personnel and teachers). It provides feedback and appraisal on curriculum renewal, determination of hard spots, and collection of data from states and districts and dissemination of information of schemes. It serves as a meaningful technique for seminar/paper presentations, academic discussion, sharing innovations/research and guidance and counselling of parents, teachers, teacher-educators and children.

ICT-Enabled Teacher Education Programme

Pradhan attempts to design the framework of an ICT Enabled Teacher Education Programme, which according to him, is the need of the hour in 'digital age'. Digital technologies should permeate teacher-education programme too. Knowledge transmission from a teacher to pupil has an intervening variable viz., variety of information resources. There is a paradigm shift now from traditional mode of teaching. In the present-day world, the teacher is not a mere transmitter of knowledge but also a facilitator, collaborator, coach, mentor, knowledge navigator and co-learner in the teacher-learning process. Pradhan collates his presentation of ICT design on the basis of UNESCO's four themes in teacher education curriculum (i) content and culture, (ii) leadership and vision, (iii) life long learning (iv) planning and management of change.

All these aspects should be infused into teacher education curriculum. Technology should facilitate this process as it enables the development of these competencies. The author has organized ICT competencies into four groups (i) content and pedagogy (ii) collaboration and networking (iii) social issues, and (iv) technical issues.

Tamil Nadu's Action Plan for Teacher Training for e-Learning Solutions

Ayyappan envisages for training of all the teachers in the country based upon his plan of action, his immediate target group i.e. 1.8 lakhs primary and elementary teachers of Tamil Nadu in basic ICT skills and lists the ways and means of content development for e-learning so as to build their e-learning capacities. With the launch of EduSat, exclusive Satellite for educational services on September 20, 2004, there exists a wider scope now for an interactive satellite-based distance education system for our country. Further, the BSNL Broadband (broadband internet) is considered a boon for internet based e-learning solutions. The broadband services launched on January 14, 2005 will reduce the cost sharply. According to Ayyappan, if all goes well, by 2007, Tamil Nadu will be the most wired state in the country from the perspective of e-learning or e-education. Benefits of e-learning and training are obvious including learning anywhere, anytime, cost saving, flexibility within specific learning, global interaction with other participants and availability of tutor experts. Ayyappan's capacity building action plan in ICT-enabled e-learning solutions is planned in six phases in Tamil Nadu, which will fulfill the present ICT needs of the teachers. These six phases are (i) training all teachers in basic ICT skills (ii) need analysis and research team (iii) content-development design (iv) development of materials in electronic form (v) implementation – web enabling (vi) evaluation. Logistics for implementation of these six phases need to be evolved which will deal with (i) syllabus for ICT training (ii) time budget and financial budget (iii) allocation of responsibilities and duties at all levels of administration.

Bihar's Perspective Plan for ICT Implementation at Elementary Stage

Jha in his paper analyses the Perspective Plan of Bihar State for implementation of ICT with reference to quality improvement at the elementary stage of education. He proposes a perspective plan for implementation of ICT in terms of constitution of several groups – academic group, producer group, graphic group and multimedia expert to generate software for use in teacher training programme in the state. The software may be produced in the form of CDs, other software with the help of these groups. At each stage a check would need to be carried out to evaluate the software and obtain continuous feedback. The author emphasizes the need for proper coordination between different organizations, such as SIET, SCERT, DIETs, BRCs, SPO, etc. involved in developing software.

Section II

There are six case studies, albeit of preliminary nature which may be graded as a `test-case' of ICT applications for quality improvement of elementary education. A brief description of each case study is as under.

Interactive Radio Instruction

Sudhish in his presentation, discusses the successful experimentation on Interactive Radio Instruction (IRI) Project being implemented by the State Government of Chhattisgarh in its tribal schools in collaboration with Education Development Centre (EDC)-USA. This case study is based upon a collaborative endeavor. EDC has been chosen to execute the dot-EDU T4 programme in India in cooperation with the Government of India and the States of Chhattisgarh, Jharkhand and Karnataka. It is promoted and funded by United States Agency for International Development (USAID) with active co-operation from Academy for Educational Development (AED) and Georgia Institute of Technology. Interactive Radio Instruction Programmes were planned for Introductory English in collaboration with the State Government and local NGOs for use at the primary school level. The programmes were started as pilot projects with radio broadcasts in selected blocks of Raipur, Kanker and Bastar districts of Chhattisgarh.

A digital studio was set-up in SCERT, Raipur. Radio scripts were developed to suit local needs. After proper planning and execution of the pilot project it was found that gains from this experimentation to rural children are higher than those to urban children. However, the author states that this data should be interpreted cautiously because the small size of urban groups would suggest that they come from a single school. Further, the gains in speaking English and comprehension in the mid-tests against the pre-tests were higher in case of girls compared to those for boys.

Primary Teachers Involvement in the Development of Educational Audio Learning Material

Madhvi in her research paper pleads that audio material for both children and teachers at the Primary Schools are useful, creative and involved teachers in the process. The MLL approach has been implemented in primary schools in Gujarat state since June 1994. The focus of this approach is on activity-based, joyful learning and competency-based programmes. The present research paper is based upon the programme initiated by ET Cell of DIET, Rajkot (Gujarat). The teachers of this DIET took the responsibility of production, singing, composition and selection of songs in audiocassette format. The audiocassettes prepared by ET-DIET, Rajkot were distributed to the classrooms through the coordinators of Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs) of the Rajkot district. The primary school teachers used these while teaching. The findings suggest that use of audiocassettes by the teachers helps in providing activity-based, joyful learning to children and they take great interest in classroom activity. Teachers' involvement in the development of audio cassettes provide them and enhanced their motivation and self-esteem.

Computer-Aided Education (CAE) for Teacher Empowerment

Minakshi advocates the case for computer-aided education (CAE) for teacher empowerment. She cites a case study of Orissa Government. Orissa Government has implemented a programme of computer-aided education on the principles of BOOT (Build, Own, Operate and Transfer) modeled on the Mahite Sindhu Project in Karnataka and similar programme in Andhra Pradesh. APITECH Ltd. and EDUCOMP Ltd (selected through national bidding) under the supervision of DEP-SSA, Orissa have implemented CAE in 300 schools covering 12 districts by each company. Facilities provided by these companies include hardware for each school, training to two teachers of the school under CAE, on the spot academic help and facilitation. Content development has been in CD format for classes V, VI and VII. The contents of CDs are based on hard spots identified by school teachers. This process has helped in the up gradation of teachers' skills and enhanced their professional competency as well.

Impact of Teleconferencing Mode in In-service Teacher Education Programme

Paramane and Gokhale deal with the follow-up study carried out by them on teleconferencing in Maharashtra. The study is based on the reactions of resource persons who had completed training by teleconferencing mode arranged at the district place about the techniques used and facilities available during training viz. the use of telephone facility provided in teleconferencing, presentation on TV, the usefulness of the tele-material provided to primary school teachers and finally use of the mode for better in-service training.

In Maharashtra, in-service teacher training programmes are organized in two phases. In phase I training is provided to resource persons through teleconferencing arranged at DIET. In Phase II training is provided at the beat level through cascade mode by the resource persons who have undergone this training at Phase – I.

A sample of those 40 efficient primary teachers who served as resource persons in Phase-I training was selected from 8 *talukas* and Corporation schools. The second sample was chosen from primary teachers who got training at the beat level by cascade mode. Ten primary teachers from each of the 8 talukas and ten teachers from each of the four Corporation schools were randomly selected to collect data about training by cascade mode. Thus the total number of teachers was 120, (80+40) for each training programme. VCDs of a teleconferencing episode to impart training at beat level were used. Appropriate tools (feedback opinionnaire to obtain feedback from Phase I resource persons) about the training and Questionnaire for Primary Teachers (QPT) to obtain reactions about training obtained from resource persons at beat level (cascade mode) were used. The findings of the study suggest that majority of the resource persons getting training through teleconferencing found that the technique is quite useful with respect to telephone facility, presentation on TV and use of tele-material. Resource persons suggested that the training period should be increased for better interaction. Use of VCDs with the expert's discussion and interaction session by the trainer made the training more effective in cascade mode. However, continuous supply of electricity needs to be ensured for greater success of such training programmes. This implies the installation of inverter and battery facility in each DIET.

Use of ICT through Multi-media Training Package for Education of the Girl Child

Sujata analyses effective use of ICT through multimedia packages for providing education to the girls at the elementary stage. Multimedia package films have the potential to generate dialogue between the trainer and the trainee(s). While discussing the theoretical aspect of the utility of multimedia in education, she took up a case study of using multimedia – print material, audio, video, radio broadcast, poster, calendar, T.V broadcast, teleconferencing and face-to-face interaction (training), short film, audio cassette, live folk performance (street play), monitoring and supervision. A comprehensive Multimedia Package (MMP) outline was prepared with inputs from different areas. She selected a sample from educationally backward districts of Malkangiri, Nawarangpur and Kalahandi. The target group was teachers, Block Resource Centre Coordinators and Cluster Resource Centre Coordinators. 20 clusters were selected in each district. Pre-testing tools were administered on a sample comprising 300 respondents including teachers, VEC members, MTA, PTA, AWW, Female activists in various clusters and blocks on random basis. Analysis of data showed that community participation is generally up to 25 percent in these districts (Kalahandi 25 percent, Malkangiri 23 percent, Nawarangpur 22 percent). Parental attitude towards girl's education showed negative impact. It was only 37.02 percent, which reveals a general lack of awareness toward girls' education. Only 33.02 percent of the community was aware of it. Community participation in school was quite low (23 percent). The author is of the view that MMP should be used more frequently to develop awareness through it on all educational programmes particularly the gender bias in education.

Headstart Project – Computer-Aided Learning in Madhya Pradesh

Vinod Kumar analyses the situation in Madhya Pradesh citing example of Headstart project, which is being implemented in all districts in 2718 Jansiksha Kendras. The Headstart Project was initiated on 14th November 2004 in 648 Janshiksha Kendras in the State. Headstart is computer-aided learning with a judicious mix of video and animation in interactive mode. This has helped both teachers and children through (i) greater motivation for self-learning (ii) self-appraisal by children/teachers (iii) additional support along with use of textbooks (iv) greater guidance to teachers' for use of computer. The author cites 48 programmes which have been used in Headstart at Janshiksha Kendra, Saliwara (Jabalpur), a result of which enrolment as well as attendance in primary classes has increased. Increase in the comprehension level of children has also been reported and attributed to it. Computer literacy of teachers has also been enhanced.

1.6 Conclusion

The contents of the fourteen papers do vouchsafe that gradually but steadily ICT culture is becoming a part of educational practice in our schools. Under Sarva Shiksha Abhiyan through centrally sponsored funding, State Governments are in the process of providing the use of ICT in its various facets. The case studies in this document indicate that there is now greater urge to use multi-media training package (MMP) as a potential support for face-to-face teacher training programmes. Computer-aided education is becoming a regular feature of urban schools these days. State Governments in collaboration with corporate sector have supported computer-aided education and computer literacy both for teachers and children. This will surely lead to further quality improvement in elementary education.

CHAPTER 2

USE OF ICTs IN IMPROVING QUALITY OF IN-SERVICE ELEMENTARY TEACHER EDUCATION PROGRAMMES

Sohanvir S. Chaudhary and V.P. Garg

Abstract

Research in pedagogical theories has improved the instructional design. Communication technologies have provided further scope of improving and reinforcing the quality dimensions both for pre-service and in-service teacher training programmes. In India where most of the elementary schools are located in remote, rural and difficult areas, there is a need to bring these schools in a network through the use of interactive technologies (use of audio conferencing, video-conferencing, interactive radio programmes, etc). The open distance mode of education and training in India has emerged as an effective economically viable and pedagogically effective that could address the training problems of (a) heavy backlog of teachers who require recurrent training, (b) untrained teachers, (c) newly recruited teachers, (d) para-teachers and EGS/AIE teachers and (e) other functionaries directly associated with elementary education. In-service training can be provided in a relatively short period and at a lower per learner cost. Further, it is to be noted that training arrangement can be made without dislocating the members of the target group from their place of work thus avoiding the management hazards. The present paper, attempts a 'situational analysis' of the use of interactive technologies in Indian context with particular reference to the elementary stage of education. This situational analysis focuses on (a) policy perspective and (b) research review of interactive technologies – educational television with particular reference to teleconferencing; interactive radio programmes. Computer-aided learning (CAL) has also been discussed. This review of research analyses the scope and constraints of each interactive technology medium and identifies its constraints. At the end, some strategic policy and programmes are suggested to improve upon the present scenario.

2.0 Introduction

The fact sheet of teaching human power in India at the elementary stage speaks about the necessity of using interactive technologies (audio conferencing, video conferencing, interactive radio programmes (IRI), educational television, etc. This is essentially for two reasons:

- potentiality of interactive technologies, and
- economic and management advantage (economies of scale, non-withdrawal of personnel from their work).

The following features characterize the present Indian scenario related to elementary teacher education:

i) Heavy backlog of untrained teachers in lower and upper primary schools.

ii) Recurrent training (in-service) of the teachers.

iii) Induction courses for newly recruited primary teachers to orient them in teaching professional.

iv) Training of a large number of papa-teachers and volunteers working at as Education Guarantee Schemes (EGS) or Innovative Alternative Schools.

v) Capacity building / strengthening the block and cluster level institutions, coordinators at Block Resource Centres and Cluster Resource Centres, the structure created under universalisation of elementary education in the country. District Institutes of Education and Training (DIETs) at the district level have been entrusted the responsibility of pre-service and in-service training of elementary school teachers and coordinators of BRCs and CRCs. At the state level, the faculty of State Council of Educational Research and Training (SCERT) are responsible for framing guidelines and organize orientation/training programmes for all functionaries, including DIET faculty.

Any professional training (pre-service/in-service) demands, besides acquisition knowledge, professional skills, positive attitude towards the profession and commitment on the part of the trainees. It is true of teaching profession too. The face-to-face mode of training supported by multi-media for providing curriculum, pedagogical and contextual interventions and reinforcement by evaluative and monitoring mechanism can yield the desired results.

2.1 A Case for Information and Communication Technologies (ICTs)

Recent studies (e.g. Radha Mohan 2004, 147) reveal that the best predictor of the skills that teacher education graduates have is infusing information and communication technology (ICT) into instruction. Murnane and Levy (1996) have identified three basic skills that young people (in this case new teachers) must develop to succeed in their workplace. These skills are:

- The hard skills including Mathematics, problem solving and reading.
- The soft skills including oral and written communication skills and the ability to work in groups.

2.2 Policy Framework for Television Broadcasting

The Sixth Plan document highlighted that modern technology should be used extensively to extend education to all sections of society as well as to improve the quality of education in a shorter frame of time.

> *"The importance of educational technology has to be adequately provided for greater efficiency and effectiveness and wider reach of the educational programmes. This would be made possible with the launching of the INSAT. The possibility of using modern technology to take education especially at the elementary stage to all sections of population in a shorter frame of time has to be capitalized for achieving minimum basic education of all people within a decade (para 21.9)".* This has been reiterated in the National Policy on Education, 1986.

Important committees/working groups on broadcasting: Various committees and working groups were set up to bring improvement in public broadcasting media The following three important committees/working groups reviewed the functioning of the state broadcasting organization in the country:

- The Committee on Broadcasting and Information (1964) known as the Chanda Committee;
- The Working Group on Autonomy for Akashvani and Doordarshan (1977), known as the Varghese Committee, and
- The Working Group on Software for Doordarshan (1982), known as the Joshi Committee.

These Committees have deliberated various issues related to the broadcasting services in India and gave recommendations to improve the effectiveness of radio and television services for socio-economic and educational development of society. Joshi Committee (1982) suggested an integrative, interactive and participatory model of communication and advocated that broadcasting media should be used for creating enlightened citizenry in our democratic society.

The Supreme Court judgment on airwaves in 1995 raised critical issues regarding the state monopoly over airwaves, freedom of speech and expression and private broadcasters started airing educational programmes. As a result the Cable Television (Regulation Ordinance, 1994) started another phase of cable TV in India.

Broadcasting policies with particular reference to education: The Government of India introduced educational technology (ET) scheme in 21 States for the first time in 1972 (MHRD, 1988). The focus was to establish ET cells and use the available traditional audio-visual aids for teaching learning purposes. With the massive investment in the development of television networks via Indian National Satellite (INSAT) during the Sixth Five Year Plan (1980-84), satellite technology broadened access to education particularly to elementary education. INSAT-based communication made it feasible to extend educational broadcasting for higher education in 1984. The Scheme of Educational Technology (1988) brought into focus the ethos and plan of action for educational technology to achieve the mandate given by the National Policy on Education (1986). Since 1991, the government has used INSAT series essentially to improve access, equity and quality of formal education.

2.3 Convergence of ICTs

With the launch of EduSat on 20th September 2004, enormous capacity for providing quality education at the national, regional and state levels has become possible. EduSat provides connectivity across the country irrespective of the location of the school or the learner. It has the capacity to create virtual classroom, provide on demand audio-video programmes, transfer data/text through the network, and facilitate interactivity in the teaching learning process. The connectivity could be both-way audio, one-way video and two-way audio or both ways video. For data access learning/teaching material could be made available in central database that children and teachers could access as and when required. Audio networks could be established for organizing audio conferences. Thus the emerging technologies can provide a platform where different types of media input can converge.

2.4 Audio Medium

Because of easy accessibility, affordability and appropriateness for a wide range of teaching and learning situations a variety of audio medium, such as audiocassettes, radio broadcast, radio-vision, radio-text and interactive radio is being used in education (Thomas, 2001). Sanjay Mishra (2005, 76) while analyzing evaluative studies on audio research reports that so far educational media have tended to focus more on the achievement of learners at the school level. This could be used for distance education for adult learners. With the expansion of FM radio in the country, the audio medium would make quality educational input accessible to a cross section of society. Interactive radio where the listeners can interact with experts and teachers can motivate both students as well as teachers (Chaudhary and Bansal, 2000). Interactive radio can cater to region specific needs of learner groups because:

- it can develop a healthy academic relationship between resource person and children;
- it can benefit the disadvantaged groups, such as physically and visually challenged and women; and
- use of local language for interaction can motivate children to pursue their courses of studies.

Interactive radio is being used by IGNOU and other open distance learning institutions since 1998 for providing counselling to its learners. Similarly many states, such as Chhatisgarh, Jharkhand, Karnataka, Himachal Pradesh, etc. have tried interactive radio for education and training. Interactive radio has been tried in the state of Karnataka as an externally assisted project through

Education Development Centre (EDC) based in USA, which is aimed at improving the quality of education in primary schools. In India the project is known as T4 (**Technology Tools for Teaching and Training**). In-service training of teachers in content upgradation and innovative teaching learning methods and channels of instruction in English, Mathematics and Science using media ranging from interactive radio to a mobile video unit is being provided. The T4 initiative would endeavour to improve the quality of education in the states of Chhattisgarh, Jharkhand and Karnataka. The mid-term appraisal of the T4 project in Chhattisgarh has yielded encouraging results (Sudhish, 2005). It reports that the interactive radio group made greater gain in English language than the control group on both the comprehension test and the speaking test with the gain on the comprehension test being particularly striking in that the interactive radio group registered two-fold gain compared to the control group.

DPEP, Orissa and DEP, IGNOU, New Delhi broadcast radio programmes titled, *Ankur-I and Ankur-II* in the slot of *Kakali* (Children's programme) through AIR stations of Orissa during August and September, 2004. Its main purpose was to provide quality education to primary school children along with emphasis on attainment of minimum competencies in different subjects like Mathematics, Language and Environmental Studies. Feedback studies on these programmes were conducted on a sample of 2000 (600 children, 600 teachers and 800 community members) from eight randomly selected target districts (Cuttack, *Sambalpur, Koraput, Kalahandi* with AIR Stations and *Kendrapara, Dhenkanal, Rayagada, Nayagarh* without AIR stations. The findings of the study indicated that about 65 percent of teachers, 67 percent of children and 58 percent of community members opined that the programmes had average utility because of its appropriate topic selection, adequacy of subject matter, correctness of content and organization of the programmes (p17)'. Further that in comparison to boys, girl children reported the programmes as highly utilitarian. However, children from low socio-economic strata reported that listening to the radio programmes was somewhat problematic and suggested supply of radio to schools as a measure for the success of the programme. About 30 percent of total community members reported that the programme was highly useful, 58 percent felt it to be of average utility and only 12 percent among them were of the view that the programme had low utility. The participants attributed low utility to

- Broadcasting of programmes without much practical experience.
- Haphazard selection of topics.
- Inadequacy of subject matter.
- Limited duration of broadcast of the programme.
- Inappropriate time schedule.
- Problem of electricity and dearth of radio sets in schools, etc.

More than 53 percent of the target population reported story-telling method more effective for learning of *Shabda Jnana* (vocabulary) and other topics in language.

Constraints of Audio Medium

A variety of methods and strategies need to be used to create/bring liveliness and spontaneity in the audio programmes include:

- Time-to-time interaction with the target group,
- Involvement of teachers and children in the development of audio programmes,
- Development of programmes keeping in mind the level and interest of the learners,
- Creating stress-free environment for the learners, and
- Inclusion of a judicious of humour for creating interest in the learners.

It is generally argued that absence of visual effect impacts adversely upon the popularity of audio medium. A study by Gangappa and Chandraiah (2004) reports that TV lessons and teleconferencing programmes were more useful as compared to audio. This study predicts that television interactive programmes are likely to replace the face-to-face classroom teaching as the interconnectivity between the subject expert and the learner was live and interesting. In interactive technologies, the following types of constraints have been observed:

- Poor tele-density,
- Lack of enabling policies, and
- Non-availability of adequate funds.

With the launch of more FM Channels catering to the requirements of learners in India, interactive radio is in all likelihood going to impact on quality of in-service teacher education programme at the elementary stage in a significant manner. This is amply made explicit with the pilot project in Chhattisgarh, Jharkhand and Karnataka. Radio broadcast in Andhra Pradesh (*Vindam Nerchukundam), Himachal Pradesh (Gyan Kalash* and *Hellow Ankur)* and Karnataka (*Kelikal)* have proved the effectiveness of the audio medium (DEP-DPEP, 2003).

2.5 Visual Medium

With the explosion of knowledge and pacing it with new areas of emerging technologies, the demand for more and better schooling has ushered the new phase of development in developing societies including India. Severe economic constraints provided additional emphasis on and expansion of ICT-enabled education as a strong mode of teaching and learning. The availability of new communication technologies in the 1980s, e.g. satellite based television broadcasting, long-distance telephony, cable television, interactive broadcasting networks, teleconferencing, tele-text, etc., provided vast potential to support educational development in developing countries.

The following are some of the milestones in Indian educational television:

- Educational television in India made a modest beginning in 1959 on pilot basis when the Delhi Municipal Corporation telecast television programmes for education and development.
- The Satellite Instructional Television Experiment (SITE) was conducted during 1975-76 with the help of the American Satellite, which was tried in 2400 villages from 20 districts of the six states viz. Andhra Pradesh, Bihar (including Jharkhand), Karnataka, Madhya Pradesh (including Chhatisgarh), Rajasthan and Orissa. SITE was used for socio-economic and educational development of the rural masses.
- Satellite technology was further strengthened with the establishment of countrywide television networks at the national, regional and local levels.
- Educational television for primary school children (5-8 years and 9-11 years) was also introduced in 1982 in the six states where the SITE was conducted earlier,
- At the tertiary level the University Grants Commission (UGC) introduced countrywide classroom in 1984, and
- IGNOU started syllabus based programmes through telecast in 1991 in Hindi and English.

Educational TV introduced on experimental basis in the early sixties has expanded its reach covering not only education sector but in other areas too. The Central Government has used television broadcast employing low power transmitters (over 1300 of them) for area specific telecast for education and development. Educational TV has shown positive results in cognitive development (Shukla & Kumar, 1977; Neurath, 1966; Reddi, 1966; Chaudhary, 1991; Chaudhary and Panda, 1997 and Chaudhary, M.M. 1997) as well as in influencing children's personal behaviour (Aghi, 1977 and Agrawal, 1978). Research studies have reported that in the beginning both the SITE and the INSAT projects in India, the utilization of ETV programmes was satisfactory due to the following factors:

- Novelty effect of the medium.
- High motivation among teachers.
- Support of the school headmasters.
- Proper maintenance of direct reception/television sets, and
- Effective supervision and monitoring of broadcast service.

Limitations of Educational Television

Studies conducted during the post-SITE period however did not present a bright picture about the utilization of the medium. Several field studies revealed that ETV programmes remained underutilized (Shah, 1972; CIET, 1983, 1986, 1992, 1993; Behera, 1991; Chaudhary 1991; Joshi, 1988; ADMAR, 1996; Reddi, 1996). Some of the reported reasons for under-utilization of ETV were as under:

- Poor maintenance and non-functional of television sets installed at primary schools/ community Centres.
- Erratic power supply to schools, particularly in the rural and semi-urban areas.
- Disconnection of power supply due to non-payment of electricity bills.
- Non-cooperation of headmasters in utilizing the medium.
- Non-providing an exclusive television period in the class timetable.
- Lack of supervision by the officials of the user education department.
- Indifferent attitude of the custodian teachers (the teachers responsible for the operation of the television sets) and user teachers.
- Inadequate remuneration and incentive to the custodian teachers.
- Lack of training of custodian teachers in the utilization of television programmes.
- Poor quality of the programmes.
- Time-consuming process of developing a lesson plan with integration of electronic media,
- Non-availability of relevant and need-based programmes.
- Greater concern of user teachers to cover syllabus through oral presentation rather than integrating it television programmes.
- Absence of pre and post-telecast activities.

Teleconferencing

Experimentations on teleconferencing in India started in 1983 (Agarwal, 1992). IGNOU conducted a pilot project on the use of teleconferencing for education and training in October 1993. The teleconferencing system was operationalised in February 1995 and hence it became accessible to educational institutions to interact with learners located at different places. Among various types of teleconferencing, two-way-audio and one-way video teleconferencing was found more suited to the learners, as the arrangement was simple and cost-effective. Teleconferencing is recommended on sound financial and pedagogical reasons to reach large audiences located at different places with immediate, live and spontaneous interaction between the experts at the teaching-end and learners at the learning-ends.

Some research studies carried out on teleconferencing mode (Agrawal and Pande, 1992; Dash, 1997; Prakash and Lal 1998; Trivedi, 2003, Rao & Khan, 1997, 1998; Mishra, 1999, Taleem Research Foundation, 1999 and DEP, 2002, 2003) did indicate a positive impact of this medium on presentation of contents, interaction between the experts and the learners, technology related matters and activities conducted by the learners at the learning ends. Research studies have proved that if planned properly/ systematically, teleconferencing can be an effective tool for teaching and learning at a distance.

Review of research on teleconferencing indicates quite a few favourable considerations for continuous use of teleconferencing mode, however a lot of planning and logistics are needed for ensuring its high effectiveness. Reddi (1996) has reported that its sustenance use can be justified only if it is backed by improvements in timing, access to telephone and fax facilities and high quality programme content, adequate time for interaction. Information should be made available well in time to the learners about the teleconferencing schedule as well as related tele-material. Therefore, it is desirable to attend to the details in the planning, designing, execution and evaluation of educational teleconferences.

2.6 Computer Education and E-learning

Computer education has enormous scope for providing quality education and training at all the levels. E-learning has expanded and grown on unexpected pace in less than two decade of Indian education (Agrawal, 2005). Information technology (IT) related formal and non-formal courses have now proliferated both in the government and the private sectors. De-regulation of the airwaves and the telecommunication industry has spurred the revolution in basic telephony and internet services. By 2010, the total number of access (fixed and cellular) is expected to increase multifold from 65 million in 2005 to 170 or 190 million by 2010. With wider access and use of broadband, internet use will be easy and less crowded. This will be useful for in-service training and refresher courses, providing short-term knowledge programme, upgrading and updating of professional knowledge and skills of teachers and other functionaries associated with universalisation of elementary education.

The Computer Literacy And School Studies (CLASS) project sponsored by MHRD, Government of India in eighties and later on State Governments tied-up with the corporate sector has facilitated computer-aided learning (CAL) in schools. In recent years, 'Headstart' Project in Madhya Pradesh aimed at providing quality education through CAL has proved effective. Many other States are also in the process of developing and using interactive multimedia CDs to improve classroom processes.

The evaluation of CLASS Project, however, indicated 'low performance-not because of lack of enthusiasm or ability to learn, but because of the lack of infrastructure and other management and administrative hurdles' (Agrawal, 1996). These constraints are enumerated as under:

- Lack of regular supply of electricity in the rural area,
- Difficult terrain and topography in some geographical areas,
- Shortage of relevant software due to low level of production and reception facilities,
- Lack of integration of all media,
- Absence of proper networking among provider and user agencies and institutions,
- Shortage of trained IT professionals, and
- Non-availability of required language tools in regional languages.

Facilitating access to computers in various regional languages: Due to the constraint of non-availability of language tools in regional languages, the use of personal computers at the elementary school levels in India has been slow. The number of personal computers in the country has however, grown from 46 lakhs in 2000 to 1.30 crore in 2004. At present, the PC penetration in India is less than 12 per thousand persons. Software is being indigenized with language interfaces but these packages come at a high price. It is but natural that bundling of multi-lingual software with personal computer and other access devices will prove to be a catalyst in promoting its usage in the country as it did in countries, like China. It is reported that from December 2005, computer manufacturers will come pre-loaded with the language tools developed by CDAC – a collaborative partner of the Technology Development for Indian Languages (TDIL), which is an initiative of the Department of Technology. This software is likely to be made available in Hindi, Tamil and Telugu (The Hindustan Times, New Delhi, November 15, 2005, P.14).

2.7 Strategic Policy and Programmes for Use of ICTs

Situational analysis of the use of ICTs suggests that there is a vast scope of their applications in teacher education programmes more specifically at the lower and upper primary stages. Being a formative stage for the children of age group 6-14 years, it demands a better quality of education, which could be ensured by better qualified, well-trained and enlightened teachers. ICTs are best suited to meet this imperative demand. Based on the lessons learnt through earlier experiments using ICTs, it is recommended that providing the following inputs can ensure optimal utilization of these ICTs in education sector. Planning, organization and institutional structure for ensuring user responsiveness, content generation, suitable to local-specific needs in regional languages

Logistics for production of the software – audio programmes (audiocassettes, radio broadcast, interactive multimedia CDs, teleconferencing, tele-material, video-conferencing, CAL, etc.) and making these available at the user-end, proper coordination between production and user-end targeted agencies, advance information through networking arrangements for circulation of programme schedules, installation and maintenance of infrastructure, installation of satellite interactive terminals (SITs), receive only terminals (ROTs) and direct reception sets (DRS) etc at the well-considered strategic locations for regular transmission of educational audio-visual programmes and teleconferencing sessions.

Regulatory bodies can work out short-term and long-term strategies to improve quality of education through the use of computer. This would surely require a significant amount of investment in hardware and software, which is desirable and productive. A proper training strategy of training resource persons from the top end to down the line should be designed and professional profiles of these resource persons may be prepared for ready use. The role of State Councils of Educational Research and Training (SCERT), State Institutes for Educational Technology (SIET), State Institutes of Educational Management and Training (SIEMAT) and District Institutes of Education and Training (DIETs) at the State level would also need to be redefined so that these institutions may network among themselves and with the national level organizations like Indira Gandhi National Open University (IGNOU), Indian Space Research Organization (ISRO), National Council of Educational Research and Training (NCERT), National Institute of Educational Planning and Administration (NIEPA) etc collaboration among government agencies, corporate houses and voluntary agencies would necessitate further articulation of redefining their role and the nitty gritty of the nature of partnership. Success stories of such partnerships can be replicated for further benefit.

2.8 Conclusion

Against the Indian background where two-third of the population is domicile in the rural sector, with low level of literacy, purchasing power and embedded in complexities and diversities of language and culture, easy access to ICTs can provide a strong support. This however requires careful and serious planning and management in delivery system and regular monitoring for providing prompt remedial correction. For quality check, in-built feedback and research studies should also be carried out. With the launch of EduSat, there is a dire need of development of e-content and appropriate software to harness its full potential. Proper networking of educational institutions should be arranged for planning, development and sharing of software. District Institutes of Education and Training (DIETs) need to be equipped and empowered so that local-specific need-based software may be developed and used for children, teachers and functionaries.

To ensure effective utilization of ICT in elementary schools, there is a need to train, empower and motivate teachers and children. Besides making ICT easily accessible, the headmasters and educational administrators have to extend full support to the teachers whose commitment/ initiative can make the use of ICT in classroom. Regular monitoring of the use of ICT and corrective measure can also ensure quality improvement.

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CHAPTER 3

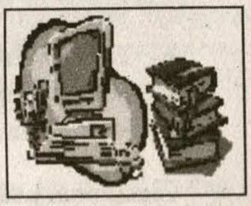
IMPACT OF COMPUTER-AIDED LEARNING ON QUALITY OF EDUCATION

Ashwani Kumar Baghel and Vivek Nagpal

Abstract

In this paper three key issues are raised: i) is computer-aided learning the same as computer education? ii) How can computer aided learning improve quality of education? iii) Can CAL be counterproductive, confusing and distracting for learners? Other issues though comparatively less important have also been discussed. Computer-aided learning (CAL) influences quality of education provided that it has been implemented in the right spirit and manner. It is a myth that CAL and computer education are one and the same. Although computer education is a much wider subject and it is facilitating computer-aided learning through the use of various applications, yet they are not the same. CAL is learning to learn a curriculum subject with the help of computers without the necessity of learning computer as a subject, while computer education is learning about computer and software packages. Too much use of CAL may produce dysfunction, because other factors contributing to the quality remain neglected on account of shortage of funds. Also children may be carried away by the demo effect of computers or the name of CAL; the focus of the child gets deviated towards computer education. But if the dysfunction of CAL is controlled and only hard-spots are taken care of, the quality of education is more likely to improve in terms of better performance, attendance and teaching methodology. In this context the Q-CAL hypothesis has been examined in this paper.

3.0 Computer-Aided Learning: Concept



Computer-aided learning is a dimension of teaching-learning process in which computer and its peripherals are used to impart education in more effective manner. This facilitates the process of learning and understanding a subject.

3.1 Issues in Computer-Aided Learning

There are certain issues involved in computer-aided learning which need to be addressed.

- Is computer-aided learning the same as the computer education?
- How can computer-aided learning improve quality of education?
- Can CAL be counterproductive, confusing and distracting for learners?
- Can CAL be applied to all subjects and all topics or there is a need to focus on hard spots only?
- Can computer-aided learning reduce the role of a teacher or even totally replace him/her?

Is Computer-Aided Learning Same as Computer Education?

If a school is provided with six to eight computers in an air-conditioned lab with a computer instructor/teacher with a degree in computer science and a few computer books are prescribed in the course covering MS office, Internet, etc, it is not computer-aided learning It is rather computer education. In computer education the objective is acquisition of computer skills and expertise. Computer-aided learning requires just one computer in classroom along with (multimedia projector or big screen T.V.) and software containing relevant knowledge base for the targeted group of learners. There may even be a total absence of computer in a classroom and still a teacher may be using computer-aided learning. Instead of computer a big television set or other equipment like K-Yan may be used to support learning. In this case the learning material is downloaded from a satellite like EduSat. These learning materials may be developed with the help of computers at some other educational centres. Secondly, the teacher imparting training need not be a computer professional; instead he must be a subject teacher. The subject teacher may be given training about how to use computer-aided learning materials in the classroom. There is no need to impart computer education to a subject teacher.

How Computer-Aided Learning Improves the Quality of Education?

Discussing quality parameters as inputs for curriculum transaction process, the following components can be considered.

- **Basic infrastructure and other facilities**
    - Classroom
    - Blackboard.
    - Electricity
    - Drinking and sanitary facilities

- **Curriculum and teaching learning material**
    - Coverage of syllabus
    - Quality of books in terms of paper, print, style and balance between text and graphics)
    - Charts, maps, models, slides etc.

- **Teacher and teacher preparation**
    - Teacher's training,
    - Teacher's qualifications
    - Motivation and inspiration level of teachers

- **Classroom practices and processes**
    - Mode of delivery (dictative/interactive)
    - Interaction of children in groups
    - Extra curricular activities like painting competitions,
    - Creative writing competitions, sports events and
    - Organizing science fairs.

- **Opportunity time (teaching-learning time)**

- **Management and community support**
    - Creation of Parent Teacher's Associations
    - Community support to educate illiterate and out-of-school children

- **School and classroom environment**
    - Seating arrangement
    - External environment (e.g. level of noise outside school, air pollution etc.)

- **Learner's participation**
  - Time devoted by the learner to self-study and classroom participation.
  - Mental presence of child.
  - Degree of absenteeism.
  - Attitude of a child towards education.

- **Learners' evaluation**
  - Attitude of children towards education in general and schooling in particular.
  - Attitude of children towards teachers.
  - Attitude of children towards themselves as learners.

- **Monitoring, supervision, etc.**
  - School and class inspection.
  - Continuous monitoring of learners' progress.

Quality Improvement through CAL

The overall quality of learning improves through CAL because of the following factors:

i) Presentation style of computer-aided learning material is better than that of traditional books

- *Animation and graphics:* These help a learner comprehend things/phenomena and facts easily. Books do have diagrams, graphs and pictures. To show movement, a diagram/picture may be used three or four times in books. But with the help of computers, an entire animation episode/process may be demonstrated. One may also add video clippings of historical events to impart additional knowledge.

- *Sound:* Computer aided learning can make use of sound/ music etc. that may be supported by animation. One can present roaring of a tiger, barking of a dog, mewing of a cat etc. to illustrate the lesson.

- *Storage and distribution:* Computer-aided learning material can be developed with the help of professionals, teachers and educationists. Enormous material can be stored on a few compact discs, which may easily be replicated at a very nominal cost. Such material is easy to distribute too.

ii) Time management

Computer-aided learning material saves time as it keeps the children busy in the learning process and reduces time wasted by pauses of a teacher during lecture.

iii) Interesting

It is a well-known fact that an interesting topic is far easier to learn/memorize than a boring one. CAL makes even a boring topic quite interesting and hence has more lasting impact on learners' memory.

S.C.E.R.T., West Bengal Library

iv) Continuous upgradation

The methodology of teaching a curricular subject differs from teacher to teacher and from time to time. The performance of same teacher may not be the same in two different lectures. But the lectures supported by computer- aided learning material maintain almost the same quality. Moreover with the support of subject experts, the quality of teaching may be further improved. Continuous improvement makes teaching and learning of the content to be more effective, more consistent and more enduring.

v) Repetitive nature

One may refer to or use computer-aided learning material a number of times without any loss in the quality of contents whereas a teacher may not be able to maintain the same quality in all of his/her lectures. Repetition of content with CAL improves retention.

In brief, computer-aided learning affects various parameters directly or indirectly. It increases learners' participation by making the learning process more interesting, more effective management of opportunity time through effective presentation of material prepared with the help of subject experts.

Can Computer-Aided Learning be applied to All Topics of All Subjects?

Although it is possible to convert most of the topics in all the subjects including even games, drawing etc. in electronic form yet it is not advisable to do so. To a great extent computer-aided learning can improve quality of education but its excessive use in the absence of supervision and monitoring will make a child a computer/TV addict. Besides the development of healthy reading habits in children, organizing educational tours, conducting extra curricular activities like games and sports, creative writing competitions, painting competitions etc. is very helpful in the development of overall personality of a child. To start with, only the hard spots or selected areas where most of the students find it difficult to understand may be developed for CAL. Once computer-aided learning is integrated in the education system, the possibility of including more topics may be considered in phased manner depending upon the difficulty level of the topic and the degree to which it can make it easy to comprehend for a child.

The topics, which are relatively more amenable to computer-aided learning, are the following:

- **Science:** Concept of colour (how seven colours fuse into white when a disc with seven rainbow colours starts rotating.), concept of three basic colours, mirror formulas (depicting what is virtual image), working of electric motor, working of heart, lungs, digestive system etc., germination of a seed, working of a piston in a petrol or diesel engine etc
- **Geography:** Spherical nature of earth, formation of seasons, solar system, core of earth, volcanic eruption, rainfall and soil erosion etc.
- **Mathematics:** Different concepts in geometry like circle, triangle, three-dimensional concepts e.g. cube and sphere can be easily explained through animation. Some difficult concepts of algebra like finding out the square root, solving simultaneous equation etc can also be animated to some extent through CAL.
- **Languages:** Teaching and Learning pronunciation can be supported by sound and calligraphy, formation of letters etc can be animated.
- **For Kindergarten:** Nursery poems with music, counting etc.

Most of these topics may be animated to show the working of a phenomena or illustrating a concept. A question bank may also be developed to support a knowledge bank with varying degree of discrimination and difficulty levels.

Can CAL be Counterproductive, Confusing and Distracting?

To answer this question we propose a hypothesis entitled Q-CAL to judge the effect of computer-aided learning on quality of education.

Assumption of Q-CAL Hypothesis

- Funds/ economic resources are limited for a school.
- Students' learning time is limited.
- The more one uses computer the more one feels one know about it.
- Quality of education and level of computerization can be quantified indirectly through other quantitative variables.
- All other inputs contributing to quality are constant.

How to Quantify Quality of Education and Level of Computer-Aided Learning?

The quality of education 'Q' can be quantified indirectly by a set of quantitative variables as under

$$Q = P + T + (W + S) - A - F$$

Where

$$\sum P \frac{i = n}{i = 0}$$

P = is average percentage of marks in examination of all children of all n sections of all classes under observation

$$I = N$$

T = (ΣP /N) is average number of points in the scale 1 to 10 given to teachers by subject.

I = 0 experts on observing his/her teaching methodology, style and extent to which they are successful in making the students understand the concepts they are teaching.

$$W = \frac{\text{Total number of drinking tapes in school}}{\text{Total number of classrooms}}$$

$$S = \frac{\text{Number of toilets in school under observation}}{\text{Total number of classrooms}}$$

$$A = \frac{\text{Total number of students whose attendance is less than 75\% in all classes}}{\text{Total number of sections in the school (for all classes)}}$$

(A is the average number of students per section who remain absent for more than permitted number of days).

F is the percentage of children who fail in the examination (i, e those who cannot attain even 35% marks).

The level of CAL 'L' is indirectly quantified by

$$L = D + X + T$$

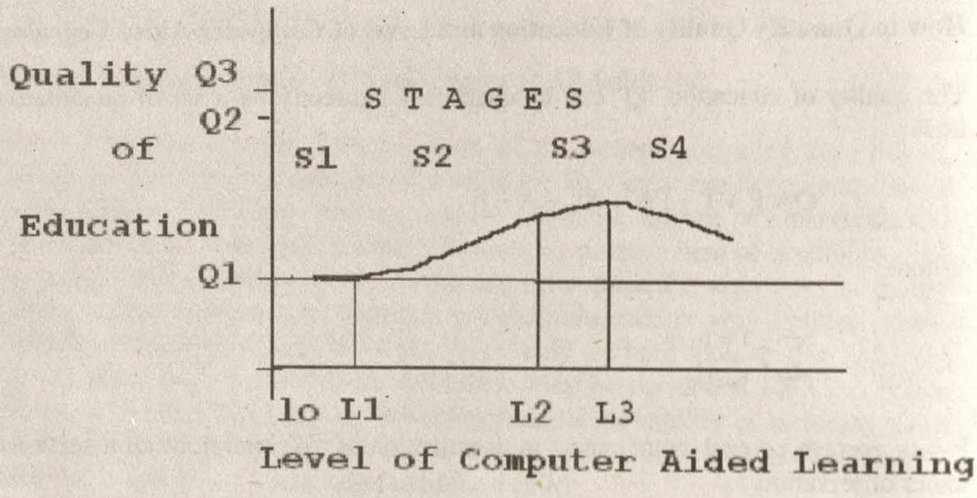
Where D = c + p + r (D represents availability of computer and allied infrastructure).

Where

c is the total number of computers per 1000 children.
p is the total number of projectors per 1000 children.
r is the number of printers and other devices like CD writer, T.V tuner card etc per 1000 children.

X is the total amount of expenditure incurred on maintenance/upgradation/purchase of computers, procuring of software per child during the previous financial year.

T is the percentage of teaching time for which computer is used with respect to total time e.g. out of 5 hours of teaching if the computers are made use for one hour then T = 1/5 × 100 = 20.



The effect of computer-aided learning on quality of education has been diagrammatically expressed in four stages or phases

Stage I: With 0 level of computer-aided education the quality of education is say Q1. Q1 the initial level is dependent on many factors like infrastructure, teacher's calibre etc as mentioned above. The level of Q1 will vary from one school to another. With slight/ negligible introduction of computer-aided learning (from Lo to L1) there may be no significant change in quality of education because there is a threshold level above which the computer-aided learning is effective, other factors remaining the same. One or two lectures of 30 minutes in a year can hardly be conceived as an effective input for improving quality of education. This is the first stage where no significant change in quality of education is observed.

Stage II: Beyond the threshold level i.e. L1, there is a significant increase in the quality of education because computer-aided learning attracts students towards learning. In this stage i.e. S2, not only the quality of education increases but the rate of increase in quality also increases because of increased motivational level of teachers as well as students.

Stage III: At S3, the teachers and children gradually start understanding computer jargon although this is not required for computer-aided learning. Teachers gradually start using Internet, making their own presentation using MS-office or any other tool. In the third phase the growth is slowed because most of the benefits of computer-aided learning have already been exploited.

Also the dysfunction of computer-aided learning starts appearing. But still the level of quality of education is rising because of the push and pull between advantages and disadvantages of computer-aided learning.

Stage IV: In the fourth stage 'S4' the growth has not only been hampered but also a negative growth is recorded. This is because of two major factors.

i) The dysfunctions of computer-aided learning are more than the benefits of computer-aided learning. The dysfunctions of computer-aided learning are

- lack of reading habits in children;
- using computers for playing computer games for very long duration at home or in the classroom;
- loss of time due to system failure, virus infection or power failure;
- inability of CAL software to match the syllabus. Generally lot of teaching time is wasted in useless animation and sound. Sometimes they give extra information and sometimes they lack proper elaboration; and
- inadequate interaction between student and teacher.

ii) The boundary between computer-aided education and computer education is consciously or unconsciously evaded and more and more funds are allocated to purchase computers, air-conditioning of computer lab etc. Hence most of the economic resources are not being utilized optimally resulting in lack of maintenance of classrooms, games and sports facilities in-service training of teachers etc.

Therefore the answer to the question **"Can CAL be counterproductive, confusing and distracting"** is 'Yes'. Computer-aided learning can be counterproductive, confusing and distracting if a careless choice of CAL software is made and the school is operating at stage IV.

A debatable question is 'Can quality of education ever be at a level below Q1? Theoretically the answer is **'Yes'** and practically answer is **'No'**. As soon as quality of education declines and approaches Q1 level, the top-level management will come into action. One or more parameters of quality of education might change. A large dose of funds may be diverted to other areas like teacher training, renovation of classrooms, inspections etc.

Note: This hypothesis has been conceived by one of authors of this paper Baghel Ashwani Kumar. Although the concept has been borrowed from Economics (Law of Variable Proportion of Factors of Production) and to some extent this hypothesis is similar to the law yet there are two main differences. The hypothesis involves qualitative variables 1) Quality of education and 2) Level of computer aided learning. Both of these variables cannot be quantified directly. Quality of education may be indirectly measured by weighted sum of other quantitative variables explained above.

Another difference is that while the Law of Variable Proportion of Factors of Production is a law that has been supported by data, Q-CAL hypothesis is a mere hypothesis, which needs to be tested by research studies.

3.2 How can Computer-Aided Learning and ICT Infrastructure be built up in Schools?

During the first phase of introduction of CAL, one computer along with other peripherals like printer, CD writer, UPS and a multimedia projector may be purchased. A small programme may be scheduled for a few days not exceeding a week to demonstrate its use to teachers of different subjects. A CD may be purchased from the market covering hard spots where students find it difficult to understand the subject. Internet connection may be purchased and access to Gyan Darshan, Discovery and National channels may be provided. Different classes of different subjects may be taken in a room where ICT infrastructure has been installed. The teachers should schedule their lecture in such a way that there is optimum use of such hardware. Once this experiment is successful, the school may go for further and purchase more computers so that more than one class may simultaneously function. Instead of building computer room, the classroom should be supplemented with ICT infrastructure. Subject teacher should have control of computer. The teacher must interrupt his talk frequently and interact with the students and explain the difficult concept as best as they can. A few teachers may be identified for content generation and self-development of teaching learning material on slides. The identified teachers may further be trained to use computers to build their own slides on computer. After training, the teachers may be motivated to develop such slides. The District Education Department may depute a computer professional who can provide guidance for developing animated software on some selected topics. The contents so generated must be centrally compiled to form a more coherent and structured course material. And finally the material so developed may be made available to children, schools and NGOs on nominal payment.

3.3 Consideration for Developing High Quality Computer-Aided Learning Materials

The following may be considered while developing high quality computer-aided teaching-learning materials.

- These must be designed to support books and other teaching-learning material rather than substituting them,
- **These must be easy to understand. The sub-topics should be logically organized to form a meaningful and adequate coverage of topic, and**
- The materials must be of a presentable quality. The difficult topics must be carefully dealt with the help of graphics and animation to make them easy to understand.

3.4 Other Work on Computer-Aided Learning

Commonwealth of Learning (COL) and M.S. Swaminathan Research Foundation (MSSRF) at Chennai have developed a project on enhancing literacy at village level through the use of modern tele-centers. The village knowledge centers have divided the whole learner group into four batches and organized structured classes weekly twice at convenient hours. Participants meet once in a week for peer discussion and mutual learning and once in a month with family members of all learners to review the activities. MSSRF has also established a couple of knowledge centers in Pondichery. Availability of Internet facility attracts farmers and traders by providing information about the market-driven prices of cereals and vegetables.

i) Tata Consultancy Services (TCS) have developed a computer-based training software for urban literacy programme. Azim Premji Foundation has launched programmes for use of IT in rural schools. At present some experiments are in progress in some schools in rural Karnataka and Andhra Pradesh. The programme envisages deployment of computers as a media to impact learning competencies and to create an attractive environment in schools.

ii) The applet 'Virtual Vision' has been developed by A.P.J Abdul Kalam for visually challenged students. The software can be accessed through the President's website. It has various sections such as stories, Kalam's lectures, songs poems and music.

iii) Microsoft has a partnership with government, Department of Education, NGOs and various other stakeholders in the domain of education to spread the wave of modern age learning. It offers three integrated programs designed to support the teacher's development and of students' skills, tailored curriculum development, technical support and research. Three core pillars under the "Partners in learning" are 1) Grants –Project Shiksha 2) Fresh start for donated PCs. and 3) School Agreements. The Project Shiksha entails education grants with an investment of more than 253 million dollars over next few years to provide training, technology skills to students and teachers and assist in curriculum development. Fresh start for donated PCs will provide primary and secondary schools with a licensed copy of Windows 98/ Windows 2000 without any charge on donated machines. In School Agreements Scheme, participating schools will receive free upgrades to Windows XP professional for both new computers and computers already deployed in the classroom, and can acquire office productivity at discounted price.

iv) Information technology in schools of the city beautiful i.e. Chandigarh: UT Administration, Chandigarh aim at letting students think critically and develop analytical skills by self-learning. Under this scheme the IT classroom environment is being transformed from teacher-centric to student-centric. The existing curriculum will be enriched with innovative IT tools for teaching and learning. Four of the Government schools have been identified as SMART SCHOOLS and each has been given about 10 PCs complete with other peripherals costing about 6.7 lakhs. At present, computer literacy is being imparted in more than 85 % of schools in Chandigarh, under a self-financing scheme through a computer agency. The achievement level is evaluated online for certification.

v) Computer literacy under Sarva Shiksha Abhiyan (SSA) at Chandigarh: Under SSA in one of the centers of Alternative Innovative Education i.e. Govt. High School Sector 25 a computer instructor has been appointed. Computer infrastructure has been installed and the process of imparting computer literacy has been initiated for the children enrolled under Sarva Shiksha Abhiyan. In a time span of around six months, the children feel they have benefited a lot resulting in increase in attendance. The students too feel very motivated. They have shown much better grasp of the subject and the Administration is now planning up for an achievement test. SSA has also undertaken in first phase to target a few schools to develop them as computer- aided learning centers. An order for few sets of compact disks has also been placed.

3.5 Studies on Computer-Aided Learning

Various studies have been conducted to examine the impact of computer on teaching and learning. Many studies have concluded that computers have a small but positive effect on students' learning. A more recent meta analysis of the effects of computer-assisted instruction for the period 1984-1995 has confirmed small but positive gains on academic achievement of secondary students. However Christmann also found that the positive gain in student's academic achievement tend to decline from 1984 to 1995. Clark demonstrated that effects in previously controlled experimental studies such as effect of academic achievement gains attributed to the computer mode of delivery probably occur because of the instructional method employed in the software used. The debate continues but the point is such studies assume only one factor i.e. computer-aided learning to be variable while keeping all other factors to be constant. In real world there may be other forces pulling and pushing student performance.

In a recent study a holistic approach was used to assess the impact of teaching and learning approaches using computer (integrating computer into the curriculum) on student's learning in terms of achievement, attitudes and perceptions after a reasonably long period of computer integration. The results of quantitative comparisons did not result in a significant advantage for computer integration classes over control classes in terms of conventional test scores and computer attitude scores. *Qualitative data (the interview transcripts) however did indicate a generally positive impact of computer integration on students' training.*

The International Association for the Evaluation of Education Achievement (IEA) conducted a survey on the use of computers in schools from 1987 to 1990 in 18 countries. The IEA found that in most countries the integration of computers into school subjects was still being initiated by small groups of teachers. This integration also tended to be focused within the higher-grade levels. Although students are generally enthusiastic about integrating computers into their learning, teachers may actually discourage the use of computers because of various personal and professional constraints.

3.6 Proposed Research Study

Issues to be raised in the proposed study

- Is there any significant difference in quality of education in the school where CAL is not implemented vis-à-vis school imparting education with the help of computers assuming that other factors like teacher motivational level and infrastructure facilities etc. are constant.
- For conducting research, random sample of 30 students selected randomly from each class at upper primary level may be taken. Their marks before CAL and after CAL may be compared.
- Do the dysfunctions of computer-aided learning really suppress its benefits in the schools under study?
- How far the teachers and learners understand the difference between computer-aided learning and computer education?
- Can computer-aided learning reduce the teacher's role?

Questionnaire Proposed for the Study Follows

Questionnaire on Computer-aided Learning

Name of the School: ______________________________

1. Name of the Student : ____________
2. Class : ____________
3. Family occupation (Please Tick) : A) Service ☐ B) Business ☐ C) Agriculture ☐ D) Others ☐
4. Monthly family income (Please Tick)

   A) Less than Rs. 5000 ☐
   B) Between Rs. 5001 and 10000 ☐
   C) Above Rs 10000 ☐
   D) Not Known ☐
5. Accessibility of computer at home. Yes/No. ☐
6. For how long have you been learning with the help of computers (in months)?

   ....

   ....

7. How often do you make use of computers?

Daily ☐ Weekly ☐ Fortnightly ☐ Monthly ☐

8. How much time do you spend daily for learning on computer on an average? _____Hrs.

....

9. How much time (hrs) do you spend daily on computer on an average for games/ entertainment?

....

10. Do you make use of computer in doing homework? Yes ☐ No ☐

11. Answer the following by ticking one of the options.

- I think computer-aided learning is? ☐
- Learning computer subjects in a computer lab with 2-3 students sharing a computer. ☐
- learning Science, Maths, Languages etc in classroom with the help of a single computer and projector in the classroom. ☐

12. Do you make use of CDs/floppies related to your syllabus in different subjects, which are available in the market, at home or at school?

Yes ☐ No ☐

13. What is computer used for in your school? (Please tick one or both as applicable)

- Computer subjects e.g. MS Office, Visual Basic, Oracle etc. ☐
- Demonstrating some selected topics of science and social sciences. ☐

14. Which subjects do you find more suitable for computer-aided learning? (Please tick as many as applicable)

Social Science ☐ Language ☐ Drawing ☐

Science ☐ Mathematics ☐

15. How many students share a computer with you at school?

(Write the number in box) ☐

16. Do you find lectures supported by computer to have more lasting impact on memory? Please (tick the most suitable one only)

Yes ☐ No ☐ Cannot Say ☐

17. Do you think that computer-aided learning is a waste of time? Please (tick the most suitable one only)

Yes ☐ No ☐ Cannot Say ☐

18. Do you think that computer can replace teacher? Please (tick the most suitable one only)

Yes ☐ No ☐ Cannot Say ☐

19. I find computer-aided learning to be more suitable for. (Please tick the most suitable one only)

- Some selected/difficult topics in different subjects. ☐
- All the topics of all the subjects. ☐
- Only in learning about computer. ☐
- I do not find it suitable at all. ☐
- Any Other. ☐

20. Did you observe any change in overall percentage of your score after use of computers in learning? (Please tick the most suitable)

Increase ☐ Decrease ☐ No Change ☐

If you have observed change in overall Percentage, was it i) Less than 5%? ☐

ii) Between 5 to 10%? ☐

iii) More than 10%? ☐

21. Which ones of the following are being used at school for teaching learning?

Internet ☐ Printer ☐ Scanner ☐ Multimedia ☐ Projector ☐

22. What is your overall feeling about computer-aided learning (please tick the most suitable one only)

Very Interesting ☐ Interesting ☐ Satisfactory ☐ Unsatisfactory ☐

Boring ☐ Confusing ☐

23. What problems do you face while using computer with computers?

1. ....
2. ....
3. ....

24. What suggestions will you like to give for improving the quality of learning with computers?

1. ....
2. ....
3. ....

CHAPTER 4

ICT FOR QUALITY CONTROL IN THE CLASSROOM

B.N. Panda and Tapan Kumar Basantia

Abstract

In this age of rapid change and uncertainty, there is one thing of which we can be certain. Teachers will need to change if they are to survive and keep pace with new methods and technologies, e.g. the influence of ICTs in education. In this context several questions are being asked by many teachers and the most significant one is what will be the long term impact of ICTs into the classroom and what kind of skills will teachers need to acquire in order to be effective in an ICT based learning environment? This paper addresses these issues and examines how ICT acts as a source of power within school organization.

4.0 Introduction

Till the recent past, the process of educating someone was considered to consist of speaking, and/or listening only in a face-to-face situation. The conviction that learning takes place in classroom situation only is no longer valid. ICT has proved that learning is possible anytime, anywhere now. But ICT does not automatically add quality to teaching and learning. Rather its application to the core business of teaching can accelerate and improve learning on a number of aspects from basic skills to problem solving, information management, work habits, motivation, lifelong learning habits and the business of educational delivery (Allen, 2000; Combs, 2000; Sherry, 2001, Schollie, 2001). Furthermore, it has been shown that the use of ICT in education can help improve memory retention, increase motivation and generally deepen understanding (Dede, 1998) and promote collaborative learning and group activities (Forcheri and Molfino, 2000).

4.1 What ICT Brings to the Classroom?

Many people predict these days that ICT will bring about several benefits to the learner and the teacher. These include shared learning resources, shared learning spaces, the promotion of collaborative learning and the move towards autonomous learning. Let us examine these a little closely.

Shared Learning Resources

In shared learning resources the students and the teachers enjoy the facility of share information wherever they are in school through television monitors. In shared learning spaces networked computing facilities create a distributed environment where learners can share work-spaces, communicate with each other and their teachers in text form, and access a wide variety of resources from internal and external databases via web based systems. Using these shared systems, students develop transferable skills such as literary construction, keyboard techniques and written communication skills, simultaneously acquiring knowledge of other cultures, languages and traditions. Furthermore, students are able to make links between internal thinking and external social interaction via the keyboard, to improve their social and intellectual development in the best constructivist tradition (Vygotsky, 1962).

Collaborative Learning

In support of collaborative learning, Reil (2000) argues that much of what we now see as individual learning will change to become collaborative in future. Reasoning and intellectual development is embedded in the familiar, social situations of everyday life, so social context of learning has a great deal of importance. Collaborative learning is, therefore, enjoying an increasing share in the curricula of many schools, with ICT playing a central role.

Autonomous Learning

For promoting autonomous learning, ICT enables the student to access, manipulate, modify, store and retrieve information, which can promote greater autonomy in learning. Inevitably, the use of ICT in the classroom will change the role of the learner, enabling children to have greater control over how they study, requiring less direction from teachers. Students will be able to direct their own studies to a greater extent, with the teacher acting as a guide or moderator rather than as a director. Hence, minimal teacher involvement is required as learners become more autonomous.

4.2 ICT and the Role of Teacher

With the inevitable proliferation of ICT in the classroom, the role of the teacher must change. They key reasons for this may be the following:

i) The role of the teacher must change because ICT will cause certain teaching resources to become obsolete. For example, the use of overhead projectors and chalkboards may no longer be necessary if learners have access to the same-networked resource on which the teacher is presenting information.

ii) ICT may also make some assessment methods redundant. Factual knowledge for example, has been traditionally tested through questions. In an ICT environment, on-line tests can easily be used which instantly provide the teacher with a wide range of information associated with the learner's score and each successive test results can be recorded automatically.

iii) The role of the teacher must change in the sense that it is no longer sufficient for teachers to merely impart content knowledge. It will however, be crucial for teachers to encourage critical thinking skills, promote information literacy, and nurture collaborative working practices to prepare children for a new world in which no job is guaranteed for life. One of the most important forms of ICT i.e. the internet, gives access to an exponentially growing storehouse of information sources, almost unlimited networks of people and computers, and unprecedented opportunities for learning and research. Internet is a network of networks, providing opportunities for enquiry-based learning where teachers and students are able to access some of the world's richest information archives. Through internet, students and teachers are able to connect with each other, learn flexibly, and collaborate with others around the world. Generally speaking, geographical distance is no longer a barrier, and the age of the 'borderless provision of education' is possible now. Teaching strategies and resources and a wealth of information can be shared to the extent that it is now impossible to comprehensively track the amount of information available through internet. Hence one of the new roles of the teacher within the electronic classroom will be to separate quality information from misinformation. Hence, identification, classification and authentication of electronic information sources will be critical, the new tasks for teachers hereafter.

iv) Teachers must begin to reappraise the methods through which they meet children's learning needs and match curricula to the requirements of human thought. Internet can be an excellent way to adapt information to meet the needs of human information processing. Traditional methods of imparting knowledge, such as lectures, book etc. are characterized by a linear progression of information. The human mind is for more adaptable; it can use non-linear strategies for problem solving and act as a storehouse and retrieval of information. In this context it is worthwhile to remember the following:

- Within the next decade the film will replace print. (Thomas Addision, 1913)
- I foresee a world market for may be just 05 computers (Thomas Addision, 1943).
- I predict a time when computers will weigh no more than one and a half tons' (Popular Mechanics, 1949).
- I foresee no reason for people to have a computer in their home (Ken Olson, 1977).

v) Getting computers into schools is relatively easy but keeping them working is the greater challenge for our teachers. Professional development of teachers is crucial to optimal use of any successful technology in an education programme. Hence the training of the teachers must go well beyond basic cutting and pasting skills. Teachers need to be able to transform their classrooms from places where a static-one-way flow of information from teacher to students occurs, into dynamic, student-centered learning environments in which learners interact with peers in a team, both in their own classroom as well as with virtual classes around the world through internet and transform their classroom into interactive, inquisitive learning environments.

vi) Technology motivates both students and teachers and energizes classrooms and makes a classroom a more interactive learning environment. In the World Links Network learning and evaluation programme, one teacher in Peru said, *"I learned to break the routine of using the chalk and the blackboard. World Links forced me to make my classes more interesting, more tangible. Students are now more interested and attentive"*. The teacher and researchers have said that World Links has helped students develop a sense of responsibility, the ability to work as team members, think creatively for solutions, and share knowledge (Kozma, 2000). The greater benefit of the use of computers and the World Links training was that it broke down the barriers between teachers and students in the classroom.

4.3 Contribution of the ICT to Quality in Teaching-Learning and Evaluation Processes

The following are the parameters/ indicators that ICT can support to improve quality in teaching-learning and evaluation:

Cognition

There are several levels at which ICTs can push the boundaries of cognition: new media allow us to represent in rich and diverse ways and enable us to traverse the boundaries of art, science, language and other areas of human knowledge. It also stimulates experience and accelerates deeper understanding. It is said that the curriculum is a mind-transforming device and the school a culture of growing minds (Cole, 1985). Hence the best cognitive understandings and practice can be captured and communicated by ICTs to our growing minds and can improve the quality of learning for many, rather than few children. ICTs can give teachers access to great conceptualisers – inside and outside their own ranks – to assist. them in planning and programming cognitive development. Best of all, the interactive capacity of ICTs provides more opportunities for students to engage as creators and manipulators in the learning process. ICTs support bringing together of aesthetic as well as scientific considerations, allowing us to overlay knowledge and meaning with skill and competence and stimulate better learning outcomes (Williams, 1999).

Pedagogies

ICTs provide many opportunities to use a variety of pedagogies. As a tool, ICT can support didactic or facilitative approaches, collaboration and interaction across time and distance, enquiry or interrogation, open or closed research and lock step or mind map. The capacity of ICT to deliver information or to communicate with a mass of students in quite individual ways opens up the possibility of tailoring pedagogy to the needs of a student in time and place without the limitations imposed by peer groups. This provides opportunities for software that utilizes, for example, multiple intelligences theory.

It is argued that ICT can contribute substantially to the improvement of schooling if it is appropriately used (Deetya, 1996). The ICTs of themselves will not improve pedagogy. These can, however, support and assist teachers who shift their pedagogies to make them more student-based, project-based and collaborative in nature.

Convergence

We are experiencing convergence on many fronts, fuelled by ICTs. Technologies themselves are converging. Medical technologies are converging with educational technologies (for example, the application of brain scanning to educational purposes, of chemical impact on the brain to behaviour modification), online technologies are converging with offline technologies, digital technologies are interacting with media, with publishing industry and with entertainment, distribution and production industries. Such convergence has profound implications for the organization, management and ideology of education and educational delivery.

Invariably convergence is also occurring within the curriculum and new subjects have been added to curricula – subjects such as media studies, ecology, computing studies, environmental studies etc. Useful as these subjects might be, if we are to achieve quality outcomes for the students of the future, we must use ICTs to assist us to manage convergence (Dias and Atkinson, 2001). Through convergence it is possible to give adequate emphasis on knowledge management (know about databases, texts, graphics, formulae, logic, etc.) assisting students in making connections across many areas of study and creating new domains of knowledge specifically for groups of students. Convergence is a significant opportunity and challenge for educators. We must meet the challenge and find ICT applications to assist us in managing convergence more effectively than we have in the past because the world itself is convergent as well as divergent, we need to educate for both.

Alignment

Alignment, an emerging concept in education, is facilitated by ICT. Schools can only be effective in enhancing teaching learning and helping students achieve well-defined educational objectives when the standards, objectives, teaching, curriculum, resources, use of technology and assessment are all aligned. The content and methods of assessment must be aligned to measure standards and objectives. Technology provides valuable tools to align the system to promote student learning by providing a means of monitoring alignment and communicating these initiatives to the public. Through the use of ICT, the teacher can alter and modify the presentation as per the need of the learners. It is a fact that quality does not reside in the learning object itself, but in its pedagogical surroundings and in the teacher's capacity to easily link content with outcomes, with assessment data and with student profile information (Jes and Co, 2001).

Data Management

In educational institutions we need teachers who are good conceptualisers and multi-media communicators. ICTs open up new avenues and provide facilities to teachers and professionals to interpret data in multifold manner and give us more and better information quickly, treating the data in more than one way to praise reality with more refined approaches for describing, interpreting and appraising the educational world with greater confidence.

Culture

It is also important to view our use of and assumptions about ICTs through the lens of culture. The Delores Report made some predictions about online content and use of information technology. Delores (1996) reported there is no doubt but that individuals' ability to access and process information is set to become the determining factor in their integration not only into the working environment but also into their social and cultural environment. ICTs do not have to prove the privilege of one culture over another. Educators almost universally use the book as a tool, adapting it to the needs of particular cultures. We need also to use ICTs universally in education, without adopting the economic and cultural assumptions that have driven to its rapid globalization.

Quality and evaluation are culturally determined. Quality in education, however, also depends on specific local application, on meeting the needs of specific individuals in specific social and cultural settings, respecting specific cultural values and communities.

4.4 Conclusion

This paper analyses the potential use of ICTs in school environment. With the inevitable proliferation of ICTs in the classroom, the role of the teacher must change. Identification, classification and authentication of electronic information sources will now be critical new tasks for teachers. Internet can be an excellent means to adapt information to meet the characteristics of human information processing. ICT has brought to the classroom more learning resources and computing facilities. Teachers and students can be benefited through collaborative, autonomous and shared learning. ICT can go a long way in quality improvement in teaching, learning and evaluation. Cognition level, pedagogies to meet the required needs of a learner in time and place without imposing limitations of the peer group could be facilitated by it. ICTs will provide powerful means of improving the quality of education along with significantly improved data for diagnostic and formative evaluation. This potential will be realized only if educators in various sectors take up the challenge and of adaptation and change.

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CHAPTER 5

NEED FOR INFORMATION AND COMMUNICATION TECHNOLOGIES PENETRATION IN A NEW PARADIGM OF LEARNING

H.K. Senapaty

Abstract

Information and communication technologies have veritably revolutionized our society. In the last two decades, technology has penetrated into every area of society and every aspect of social and cultural lives dramatically. But, teaching and the world of education to a large extent have not yet taken full advantage of these changes. We have failed to capitalize on the potential of new technologies and particularly digital technology as a learning tool. We have allowed our schools to run on traditional lines whereas the children in schools have to face the challenges of the digital age of 21st century. Whose fault it is the children or the school? It is high time to revise our educational practices and rejuvenate our school practices so that these could meet children's needs and provide education compatible with the social system demands of the 21st century. It is in this context, an attempt has been made here to analyze the role of information and communication technologies in a new paradigm of learning.

5.0 ICTs in New Avataar

Information and communication technologies have revolutionized our society. In the last two decades, technology has dramatically penetrated into every area of society and every aspect of our social and cultural lives. Television set the ball rolling. Television rediscovered and recast the world as a direct experience. Computers made it possible for vast amount of information to be made instantly available and processed with the stroke of key. The very nature of work has changed, with an increasing demand for workers who can master new technologies and use them to conduct business that formerly was conducted through traditional processes and did not require computer at all. Children are now used to environments where they can control information flow and access it with the press of a button, in which geographic mobility, intellectual flexibility, and the synthesis of work and learning are the norms.

5.1 The World of Education and ICTs: A Missing Gap

The World Education Report (UNESCO, 1998) notes that the new technologies challenge traditional conceptions of both teaching and learning and, by reconfiguring how teachers and learners gain access to knowledge, have the potential to transform teaching and learning processes. ICTs provide an array of powerful tools that may help in transforming the present isolated, teacher-centred and text-bound classrooms into rich, student-focused, interactive knowledge environments. To meet these challenges, schools must embrace new technologies and appropriate new ICT tools for learning. They must also move toward the goal of transforming the traditional paradigm of learning. According to the Information and Communication Technologies in Teacher Education, UNESCO, (2002), national economies become more internationalized, with the increasing flow of information, technology, products, capital and people between nations.

Although schools are embedded in our culture and reflect its values, technological changes that have swept through society have left the educational system largely unchanged. In the last two decades a dramatic rift has occurred between the process of teaching and learning in the school and the ways of obtaining knowledge in society at large. There have been no wholesale revisions of school curricula and no substantial change in the process of teaching. As a result that society and students have become a lot disillusioned with schools.

Knowledge-based Society

We are entering a world that is changing in all spheres: scientific and technological, political, economic, social, and cultural. The emergence of the 'knowledge-based' society is changing the global economy and the status of education. There is growing awareness among policy-makers, political leaders and educators that the educational system designed to prepare learners for an agrarian or industrial economy will not provide students with the knowledge and skills they will need to thrive in the 21st century's knowledge-based economy and society. The new knowledge-based global society is one in which the world's knowledge base doubles every 2-3 years; 7,000 scientific and technical articles are published each day; data sent from satellites orbiting the earth transmit enough data to fill 19 million volumes every two weeks; graduates of secondary schools in industrialized nations have been exposed to more information than their grandparents were in a life-time; there will be as much change in the next three decades as there was in the last three centuries (National School Board Association,USA,2002).

The challenge confronting our educational systems is how to transform the curriculum and teaching-learning process to provide students with the skills to function effectively in this dynamic, information-rich, and continuously changing environment.

Need for Educational Reform

This challenge has a negative effect as well. The institutions responsible for educating our children are locked in the past. In the classroom, knowledge is presented to them in a linear, didactic manner that differs dramatically from the children's previous experience outside the school. For the children, school programmes are rigid, uninteresting and ultimately alienating. This divergence between our children's' needs and expectations and our educational practice needs a drastic educational reform that will bring the classroom in line with society. The immediate task for our schools is to rise to meet the challenges of future and empower our children to learn through technology.

5.2 Our Past Experience about Learning

Mayer (1992) has shown how three views on learning have emerged during the past 100 years of research (i) learning as response-strengthening (ii) learning as knowledge-acquisition, and (iii) learning as knowledge- construction.

Learning.as Response-Strengthening

According to the first view, learning occurs when a learner strengthens or weakens an association between a stimulus and a response. This first view i.e. learning as response-strengthening developed in the first half of 20th century and was based largely on the study of animal learning in artificial laboratory settings. The role of the learner is to passively receive reward and punishment, whereas the role of the instructor is to administer rewards and punishments, through drill-and-practice. The instructional designer of the role is to create environments wherein the learner is repeatedly is cued to give a simple response, which is immediately followed by a feedback.

Learning as Knowledge-Acquisition

Learning as knowledge-acquisition is based on the idea that learning occurs when a learner structures and enters new information in his long-term memory. This view developed during the 1950s, through 1970s and was based largely on the study of human learning in artificial laboratory settings. The role of the learner is to passively acquire information, and the teacher's job is to present information, through textbooks and lectures. According to this view, information is a commodity that can be transmitted directly from the teacher to the learner. The instructional designer's role is to create environments in which the learner is exposed to large amount of information through textbooks, lectures and computer-based multimedia programmes.

Learning as Knowledge-Construction

Learning as knowledge-construction is based on the idea that learning occurs when a learner actively constructs a knowledge representation in working memory. This view emerged in the 1980s and the 1990s and was based largely on the study of human learning in increasingly naturalistic settings. According to this view, the learner is a sense-maker, whereas the teacher is a cognitive guide who provides guidance and modelling on authentic academic tasks. The instructional designer's role is to create environments in which the learner interacts meaningfully with academic material, and to foster the learner's processes of selecting, organizing and integrating information.

5.3 The Traditional View

The existing view of the learning process emerged out of the factory model of education at the turn of the 20th century, which was highly effective in preparing large numbers of individuals with skills needed for low-skilled work in industry and agriculture. Information and Communication Technologies in Teacher Education, UNESCO (2002) notes that the traditional educational paradigm is often characterized by the following assumptions and postulates:

Learning is Hard

Many experts view learning as a difficult and often tedious process. According to this view, if students are having fun or enjoying what they are doing in a learning activity, they probably are not learning.

Learning is based on Deficit Model of the Student

The system strives to identify deficiencies and weaknesses of the student. Based on noted deficiencies, students are tracked, categorized, reedited or failed. The impact of the deficit model of student learning is most obvious in compensatory education programmes. Bruer, in his book, *Schools for Thought*, notes that research overwhelmingly concentrates on weaknesses of poor children. Very little research has been done on their strengths. In addition, the weaknesses identified are often deficiencies in terms of the traditional organization and content of schooling. Very little thought has been given to the idea of changing schooling to accommodate new kinds of students; all the effort has been devoted to changing students so that they can fit into the schools (Bruer, 1993).

Learning is a Process of Information Transfer and Reception

Much of our present learning enterprise remains "information-oriented," emphasizing students *reproducing knowledge* rather than *producing their own knowledge*. It also remains teacher-centered. Many still see the role of the teacher as a dispenser of information and the role of the student as a passive receiver, storer and repeater of the transmitted information.

Learning is an Individual/Solitary Process

In a study of schools in the United States, the National Assessment of Educational Progress noted that most students spend long hours working alone at their desks completing worksheets or repetitive tasks. A London Times survey of English school children indicated that students almost unanimously rejected this daily ordeal of dull and ritualistically solitary classroom activity and called for a broader and more exciting curriculum. Above all, they wanted more work allowing them to *think for themselves.* They wanted to design and make things, to experiment and to engage in first-hand observation. The Times reported, however, that there was little evidence of changes in the curriculum that would respond to the students' wishes. (Resta, 1996)

Learning is Facilitated by Breaking Content/Instruction into Small Isolated Units

The educational system is often geared more to categorizing and analyzing patches of knowledge than to sewing them together. Bruer (1993) notes that the technology of mass education is quite adept at "breaking knowledge and skills into thousands of little standardized, decontextualized pieces which could be taught and tested one at a time." Neil Postman in his book, *Teaching as a Subversive Activity*, states that our educational systems break knowledge and experience into "subjects, relentlessly turning wholes into parts, history into events without restoring continuity." (Postman, 1969)

Learning is a Linear Process

Frequently, the textbook or teacher provides only one linear path through a narrowly bounded content area or sequence of standardized instructional units. For example, in a mathematics text only one correct problem solution may be offered for a specific subclass of problems. However, the problems encountered in daily life (or in mathematics) seldom have only one solution path or sequence.

5.4 Learning Process: New Paradigm

Information and Communication Technologies in Teacher Education, UNESCO (2002) notes that in contrast to the traditional teaching-learning paradigm, a new paradigm of the teaching-learning process is emerging, based on three decades of research in human learning that encompasses the following views of the human learning process:

Learning is a Natural Process

The natural state of the brain is to learn, however, not everyone learns in the same way. There are different learning, perceptual and personality styles that must be considered in the design of learning experiences for the individual student. Given interesting and rich learning environments, and supportive and stimulating teachers, any student will learn. Teachers have often noted that children who appear disruptive or have short attention spans when confronted with typical classroom instruction may spend long periods engaged in meaningful and interesting computer-related activities.

Learning is a Social Process

The communal context of knowledge and learning is beginning to be rediscovered, as evidenced by the rapid growth of quality circles and computer-supported collaborative work in business, government, medicine, and higher education. As Vygotsky (1978) noted long ago, students learn best in collaboration with peers, teachers, parents, and others when they are actively engaged in meaningful, interesting tasks. ICTs provide opportunities for teachers and students to collaborate with others across the country and across the globe. They also provide new tools to support this collaborative learning in the classroom and online.

Learning is an Active and not a Passive Process

In most fields, people are faced with the challenge of producing knowledge rather than simply reproducing knowledge. To allow students to move toward competence, they must be actively engaged in the learning process, in activities such as solving real problems, producing original writing, completing scientific research projects (rather than simply studying about science), dialoguing with others on important issues, providing artistic and musical performances, and constructing physical objects.

Learning may either be Linear or Non-linear

Much of what now happens in schools is based on the notion that the mind works like a serial processor that is designed to process only one piece of information at a time in sequential order. But the mind is a wonderful parallel processor that may attend to and process many different types of information simultaneously.

Learning is Integrative and Contextualized

Pribram's holistic brain theory suggests that information presented globally is more easily assimilated than information presented only in a sequence of information elements (Pribram, 1991). It is also easier for students to see relations and to make connections.

Learning is based on a Strength Model of Student Abilities, Interests, and Culture

Based on the work of Howard Gardner and others, schools are beginning to consider the specific strengths and interests that students bring to their learning environment, and are designing learning activities that build on student strengths rather than focusing only upon remediating their weaknesses. In addition, schools increasingly recognize diversity as a resource rather than a problem in the classroom.

Learning is Assessed through Task Completion, Products, and Real Problem Solving of both Individual and Group Efforts

Rather than simply evaluating students through paper and pencil tests, assessments are now made using portfolios of actual performances and work in both collaborative and individual learning tasks. As noted by Driscoll (1994), we no longer can view learners as *"empty vessels waiting to be filled, but rather as active organisms seeking meaning."* Don Tapscott, in his book *Growing Up Digital: The Rise of the Net Generation* (1998), notes that we are entering a new era of digital learning in which we are in the process of transitioning from "broadcast" learning to "interactive" learning. Today's students no longer want to be passive recipients in the information transfer model of learning. Rather they want to be active participants in the learning process. There is growing recognition now that today's world requires that students be able to work collaboratively with others, think critically and creatively, and reflect on their own learning processes.

5.5 A Paradigm Shift: From Teaching to Learning

As technology has created change in all aspects of society, it is also changing our expectations of what students must learn in order to function in the new world economy. Students will have to learn to navigate through large amounts of information, to analyze and make decisions, and to master new knowledge domains in an increasingly technological society. They will need to be lifelong learners, collaborating with others in accomplishing complex tasks, and effectively using different systems for representing and communicating knowledge to others. A shift from teacher-centered instruction to learner-centered instruction is needed to enable students to acquire the new 21st century knowledge and skills. Table I (Sandholtz, Ringstaff, and Dwyer, 1997) identifies the shift that will take place in changing from a focus on teaching to a focus on learning.

Table 1: Teacher-centered and learner-centered learning environments

	Teacher-centered learning environments	Learner-centered learning environment
Classroom activity	Teacher-centered, Didactic	Learner-centered, Interactive
Teacher role	Fact teller, Always expert	Collaborator, Sometimes learner
Instructional emphasis	Facts' memorization	Relationships, Inquiry and invention
Concepts of knowledge	Accumulation of facts, Quantity	Transformation of facts
Demonstration of success	Norm referenced	Quality of understanding
Assessment	Multiple choice items	Criterion referenced, Portfolios and performances
Technology use	Drill and practice	Communication, access, collaboration, expression

Shifting the emphasis from teaching to learning can create a more interactive and engaging learning environment for teachers and learners. This new environment also involves a change in the roles of both teachers and students. As shown in Table 2 (adapted from Newby et al., 2000), the role of the teacher will change from knowledge transmitter to that of learning facilitator, knowledge guide, knowledge navigator and co-learner with student. The new role does not diminish the importance of the teacher but requires new knowledge and skills from him. Students will have greater responsibility for their own learning in this environment as they seek out, find, synthesize, and share their knowledge with others. ICTs provide powerful tools to support the shift to learning-centered education and the new roles of teachers and students.

Table 2: Changes in student and teacher roles in learner-centered environments

Changes in Teacher's Role	
A shift from	***A shift to***
Knowledge transmitter, primary source of information, content expert, and source of all answers	Learning facilitator, collaborator, coach, mentor, knowledge navigator, and co-learner
Teacher controls and directs all aspects of learning	Teacher gives students more options and responsibilities for their own learning
Changes in Students' Role	
A shift from	***A shift t:***
Passive recipient of information	Active participant in the learning process
Reproducing knowledge	Producing and sharing knowledge, participating at times as expert
Learning as a solitary activity	Learning collaboratively with others

Note: Table adapted from one developed by Newby et al., 2000.

5.6 Instructional Role of ICTs

Information and Communication Technology alone, of course, does not produce learning; technology is tool that can be used in many ways, to enhance learning. The literature generally describes three major categories of instructional use for computer-based technologies; these are: learning from technology, learning about technology and learning with technology.

Learning from the Technology

When technology is used to convey specific information or skills, Zucchermaglia (1991) describes it as "full" technology--full of information to be conveyed to the student. Maddux, Johnson, and Willis (1997) label applications that support this use as Type I applications, which are *"designed to make it easier, quicker, or otherwise more efficient to continue teaching the same things in the same ways we have always taught them"* (p. 18). Use of technology in this case mirrors traditional classroom practice: users are relatively passive, the content and interaction between the user and the software are predetermined, and there is a limited repertoire of acceptable responses. Acquisition of facts through repeated practice and rote memory, or learning from technology (Jonassen, 1996), is the goal of instruction. This use of technology was the most prevalent one in the 1970s and the 1980s (Jonassen, 1996).

"Full" or Type I technologies include computer-assisted instruction, integrated learning systems, computer-based tutoring systems, assessment software, and administrative software, such as electronic grade books or attendance record- keeping software. Computer-assisted instruction and integrated learning systems have been readily adopted in many schools as they closely match the traditional routine of classroom life. McClintock (1992) points out that technology has often been used as a replacement for existing tools, such as books, rather than as an alternative medium through which different tasks might be performed and different objectives might be achieved. Some researchers (Vockell and Schwartz, 1992; Merrill, Tolman, Christensen, Hammons, Vincent, and Reynolds, 1986) suggest that computer-assisted instruction can increase achievement because it leads to automaticity of lower-level skills through extended practice. A computer that is endlessly patient with the learner monitors this practice. In the tutorial form of computer-assisted instruction, the computer provides additional information to the learner if an incorrect answer is supplied. This continues until the learner is successful.

Hundreds of research studies have been conducted regarding the effects of computer-assisted instruction (CAI). From his meta studies on analysis of twelve effectiveness of computer-based instruction programs developed primarily prior to 1990, Kulik (1994) concludes that students usually learn more and in less time with computer-based instruction. Becker (1992), however, found numerous methodological problems with many studies that have demonstrated positive effects of using CAI. In his meta-analysis of 100 studies, he concludes that differences in CAI users and non-users are too small to have any educational significance.

Learning about the Technology

Another use of technology in schools that exemplifies traditional learning environments includes learning about the technology itself (Jonassen, 1996). Classes in computer programming and computer literacy are designed to teach students how computers work. Students learn specific skills related to using the computer, such as keyboarding skills, ethical use of computers, or a particular programming language, but these skills are not tied to other content. These classes were prevalent in the 1980s, but Jonassen (1996) observes that this use of technology is now emphasized much less in schools. He attributes the change to:

- The increasing availability of computers in society that gives students more experience with them outside schools;

- the understanding that one does not have to know how a computer works to take advantage of it as a tool; and
- the emphasis on memorizing vocabulary about computers in computer literacy classes, which had little applicability to educational goals of schools.

Learning with Technology

Learning with technology drives much of the current thinking about the use of technology to support learning (Jonassen, 1996). Bonk, Hay, and Fischler (1996) note, "*Currently popular ideas about students using electronic tools to be designers of knowledge are akin to Dewey's arguments that children must actively construct and interrelate knowledge by learning in more authentic ways*" (p. 95). According to this perspective, when technology becomes an integral part of classroom learning environment, it provides a tool for both teachers and students that can facilitate new roles and new instructional strategies.

Technology used as a tool can serve as a means to seek and process information, and to reflect on one's understandings, beliefs, and thinking processes. Used in this way, technology is "empty" as it allows the learner to enter information and explore new content relationships (Zucchermaglia, 1991). Ordinary application software such as word-processing, spreadsheet, graphics, presentation, and database software; problem-solving software; simulations; electronic mail; and the Internet are technology tools that fit into this category. These applications, labeled Type II by Maddux et al. (1997), give the user control of almost everything that happens, including the interaction between the user and the machine. An extensive repertoire of acceptable responses is provided for rather than rote memorization of facts. Type II applications encourage the accomplishment of creative, higher-level tasks (Maddux et al., 1997).

Because of the interactive nature of technology and the power of its information-processing capabilities, Jonassen (1996) proposes that when students learn with technology, it becomes a "mindtool." He defines mindtools as "*computer-based tools and learning environments that have been adapted or developed to function as intellectual partners with the learner in order to engage and facilitate critical thinking and higher-order learning*" (p. 9). Using commonly available software (databases, spreadsheets, electronic mail, multimedia, hypermedia, etc), learners employ technology to both construct and represent knowledge.

5.7 ICTs in Teaching and Learning

Instructional implications of information and communication technologies are mostly based on constructivist theory based on observation and scientific study about how people learn. It holds that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than just mechanically acquiring knowledge from the teacher or the textbook. Students become engaged by applying their existing knowledge and real-world experience, learning to hypothesize, testing their theories, and ultimately drawing conclusions from their findings.

Changing Roles of the Student, the Teacher and the Community

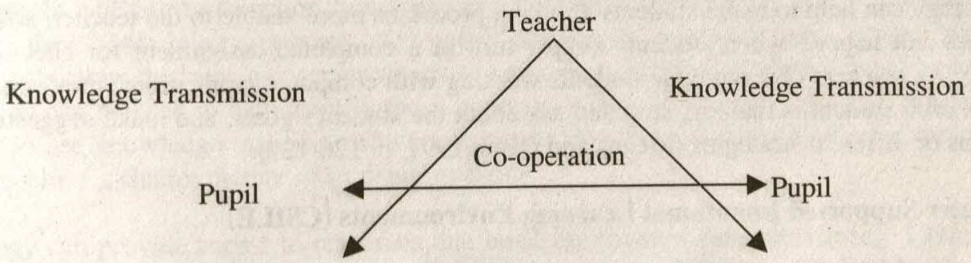
i) *Students as teachers:* The age of the teacher as the primary source of knowledge in the classroom is gone. Today, with the universe of experts and information available through the Internet, students can access new and relevant information not yet discovered by their teacher. Internet-using educators are discovering a new mode of learning that we call "side-by-side learning." It is becoming a more and more common experience to find students assuming both informal and formal roles as teachers of their peers and younger students, and in many cases of teachers.

ii) *Teacher as a coach:* Teachers who involve their students in project-based learning activities also find their own role logically and naturally changing. Rather than being simple dispensers of knowledge, they discover their primary tasks are to guide and coach and mentor their students. They teach their students how to question, and how to develop hypotheses and strategies for locating information. They become co-learners as their students embark on a variety of learning projects, which chart unfamiliar territory.

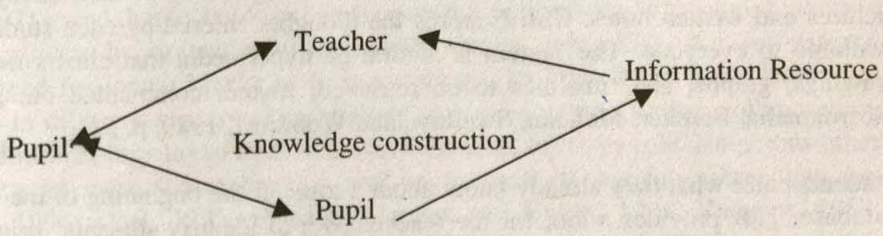
iii) *Community as guide and mentor:* With the growth of the World Wide Web, more and more of "the community" can be found online, thereby permitting closer relationships between people inside schools and outside in the "real world". Parents, business leaders, scientists, political leaders and administrators, and many other members of the community can play more effective and innovative roles as motivators, role models, and sources of information, critics, evaluators, guides, and mentors.

iv) *The changing role of teacher in icts-based interactive learning:* In the traditional teaching learning situation, the relation between the teacher and the pupil is frontal –the role of the teacher is to deliver knowledge to the pupil. There is some co-operation among pupils. Teachers do not possess adequate knowledge and skills for effective exploitation of ICTs. In many cases teachers are less expert than their pupils so far as using ICTs goes. Further, teachers find themselves in a situation where they are no longer the principal source and deliverer of information. In this context, teachers need to be properly trained for developing pupils' learning abilities. The skills needed are how to use computers as tools for learning i.e. develop a critical mind; how to draw connecting lines among different sources and types of information; and how to help pupils to construct their knowledge with ICTs.

Traditional teacher-pupil relationship



Teacher-pupil relationship in emerging learning society



For effective education, it is essential that there be more opportunities for student participation in the learning process, more team work, more self-study and self-evaluation, as well as more peer evaluation and less examination oriented teaching and learning. It is felt that ICTs can assist in promoting more student-centred and interactive learning.

The new technologies have enormous potential to revolutionize education. It is obvious that the monopolies enjoyed by schools as formal education providers will diminish.

v) *What the teacher has to do in a learner-centred classroom?:* Teacher has to use many techniques in the learner-centered teaching process. For example, he may

- prompt students to formulate their own questions (inquiry);
- allow multiple interpretations and expressions of learning (multiple intelligences); and
- encourage group work and the use of peers as resources (collaborative learning).

The literature suggests that technology can support constructivist learning environments when technology is used as a tool for learning rather than the object of instruction; it can assist the teacher in uncovering students' prior knowledge, understanding and beliefs; base instruction on the posing of problems; increase the complexity of the context; take on the role of the facilitator; increase the ability of students to test multiple scenarios and thus challenge preconceived notions and misconceptions: and, broaden the circle of social interaction to include students' peers and experts beyond the classroom, the school, the community and even their own country.

5.8 Instructional Approaches

Constructivist learning theory suggests that teachers must understand what learners bring to the learning situation and begin there in helping students build new knowledge. Basic, Type II applications offer tools to help for this process. For example, students can use word-processing software or e-mail to share their understandings with student peers as well as teachers. These uses of technology have been demonstrated to improve writing skills, produce more and better ideas for decision making, and increase motivation (Center for Applied Special Technology, 1996; Chun, 1994; Cohen and Riel, 1989; Honey and Henriquez, 1996; Mabrito, 1992; Moore and Karabenick, 1992; Naiman, 1988; Olaniran, 1994).

Technology can help to make students' thinking processes more visible to the teacher, something that does not happen when students simply turn in a completed assignment for checking and grading. As teachers observe their students working with computer applications, they can see the choices each student is making, stop and ask about the student's goals, and make suggestions for revisions or different strategies (Means and Olson 1997, p. 126-127).

Computer Supported Intentional Learning Environments (CSILE)

One technology particularly suited to this process is Computer Supported Intentional Learning Environments (CSILE), developed by researchers at the Centre for Applied Cognitive Science (Ontario Institute for Studies in Education). CSILE is a software-based tool that provides a means for students to build a collective database (knowledge-base) of their thoughts, in the form of pictures and written notes. CSILE stores the thoughts entered by each student and makes them available to everyone. The system is a form of hypermedia that allows notes entered as text, drawings, graphs, and timelines to be retrieved, linked, commented on, rated, and so forth. (Scardamalia, Bereiter, McLean, Swallow, and Woodruff, 1989, p. 52)

Students enter what they already know about a topic at the beginning of the creation of a CSILE database. This provides a tool for the teacher both to identify students' prior knowledge and to document his process of knowledge construction. Using CSILE, students can create and label written notes in a variety of ways. The labels are encouraged *"in order to facilitate reflection and to allow the notes to reappear in multiple contexts. In addition, written notes can be placed on a timeline, or attached to a spot on a picture"* (Scardamalia et al., 1989, p. 52).

Knowledge Mapping Software

Knowledge mapping software is designed to capture and organize brainstorming and idea generation sessions into concept or knowledge webs. This is a useful technology to help teachers uncover students' existing knowledge about a topic. For example, the teacher can pose a problem or suggest a content topic to students. Using the software, students can create a diagram of ideas, consisting of one or a few words, connected by "links," which may be lines or arrows or a text label. These webs of ideas may be linked to other webs, links may be changed easily, and notes may to be added to each idea in the web. All of these elements may also be converted to an outline format (Neuburg, 1997). As the teacher examines the webs or diagrams created by students, a visual representation of their prior knowledge is available for analysis.

Hypertext and Hypermedia

Hypertext and hypermedia may be used by students in a like manner for assembling and linking information to present their understanding of almost any topic. Hypermedia is software built on non-linear interrelationships among text and other elements. When text is linked to related text using programming commands, it is called hypertext. By adding elements that allow the user to move through text, images, and sound, a hypermedia environment is created. Hypertext and hypermedia are structured so that the user accesses information in ways that are meaningful to him or her (Jonassen, 1996) rather than through a linear presentation. As students create hypermedia stacks, their existing knowledge gets represented.

Simulation Software

Simulation software also offers an opportunity for uncovering and examining students' prior knowledge. *"Simulations put the student in an active role in an environment that has a set of rules"* (Maddux, et al., 1997, p. 219). As a student begins to interact with a simulation, prior knowledge guides the choice(s) s/he makes when selecting from the options offered. Observing the choices made as the student begins the simulation and discussing the reasons for those choices provides a rich opportunity for both the teacher and the student to explore the student's prior knowledge. In addition to the prior knowledge and understanding students bring to the learning situation, they also bring interests. As noted previously, teachers who create learning environments allow the learning process structure activities to build on students' current interests. Technology can be used to help identify these interests. Allowing students to create hypermedia stacks or to use knowledge mapping software to create idea webs about self-selected topics can provide teachers a clearer picture of students' interests.

Technology can provide access to resources that build on students' interests (Irving, 1991; Riel, 1994; Swan and Mitrani, 1993). Databases of information available on CD-ROM or on the Internet, however, allow students to examine a multitude of topics that may be of unique interest to an individual student (McDaniel and McInerney, 1992).

Means and Olson (1997) found that technology can support teachers' efforts to engage students in long-term, complex projects by dramatically enhancing student motivation and self-esteem, making obvious the need for longer blocks of time, creating a multiplicity of roles, leading to student specialization in different aspects of technology use, encouraging greater collaboration, and giving teachers additional impetus to take on a coaching or an advisory role. Numerous other studies have demonstrated increased motivation and engagement of students when they use technology (Dimock, 1996; Deal, 1995; Ferneding-Lenert and Harris, 1994; Harasim, 1989; Lowry et al., 1994; Mason, 1989; Moore and Karabenick, 1992; Ross et al., 1990; Ryser et, 1995; Sandholtz et al., 1997; Velayo, 1993; Williams, 1995). One study, focused on students with limited English proficiency (LEP) who used videodiscs as part of instruction over a three year period, reported that these students had significantly stronger agreement with statements such as: "I like my science class," "We do fun things in science," "My friends like science," and "I would like to take more science" than LEP students in conventional classrooms (Barrutia, Bissell, Rodriguez, and Scarcella, 1993).

5.9 Conclusion

It may therefore be concluded that it is learning with, not from or about, technology that makes computer based technology an important tool in the new paradigm of learning. In order to capitalize on the potential of new technology, and particularly digital technology as a teaching tool, there is an urgent need for the professional development of teachers. Professional development that allows teachers to construct professional knowledge about pedagogy, content, and technology, as well as strategies for managing the changing classroom environments brought about with the creation of constructivist learning environments supported by technology. To achieve this, there is a need of providing learning experiences to teachers. These experiences should be situated in an authentic context for teachers, their school and classroom. It should build on their prior knowledge and provide opportunities for social interaction with colleagues. It should begin with investigation of problems supported by technology that are relevant to teachers. By providing such learning experiences to the teachers, we can enable them to create learning experiences appropriate for the children of the Information Age and take advantage of Information and Communication Technologies in a new paradigm of learning.

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CHAPTER 6

MULTIMEDIA CONTENT GENERATION USING HTML FOR SHARING AMONG RESOURCE PERSONS OF SARVA SHIKSHA ABHIYAN

K. Madhavan and V. Manoj Roy

Abstract

Sarva Shiksha Abhiyan has been conceived as a national educational movement to achieve the target of universalisation of primary education for all children. This ambitious programme has been supported by the national government and many success stories are coming up from different states. Distance education, with the advent of digital technologies, has become a supplement to conventional education. There are available now a host of technologies to make learning interactive. Policy makers and academicians have recognized this fact and therefore have naturally selected it as an important strategy for the implementation of Sarva Shiksha Abhiyan. Multimedia content is very important for the development of interactive learning material like interactive CD or dynamic websites. Considering the multi-lingual character of our country, we should be able to have online translations of such web content. This will help reduce the cost of production of printed SIMs in Indian languages. In this paper, detailed operational aspects of the development of multimedia content for the use of resource persons in Sarva Shiksha Abhiyan have been discussed through an illustration using Hyper Text Mark-up Language (HTML) on a topic of Class VI.

6.0 Sarva Shiksha Abhiyan (SSA): Conceptual Framework

UNESCO has underlined the importance of providing educational access to all children in the age group 6-14 years with international aid programmes for universalisation of elementary education (UEE). In India, UEE started in the early 1990s. 'The forerunner of the Sarva Shiksha Abhiyan (SSA), the District Primary Education Programme (DPEP) was one such programme[1]. DPEP was launched in the early 90s, with the main purpose of accelerating the pace of Universalisation of Primary Education (UPE). DPEP was a centrally sponsored scheme implemented by state level agencies. Several international agencies including IDA funded the DPEP programme in different states both in face-to-face and distance mode.

The concept of UPE emanates from the Education for All (EFA) declaration adopted by the World Conference on EFA, held in Thailand in the month of March 1990[2]. This resolution sought to meet the basic learning needs of all children by grouping these into two categories:

i) essential learning tools such as literacy, oral expression, numeracy and problem solving
ii) basic learning content such as knowledge, skills, values and attitudes.

The success of DPEP in Alternate Schooling (AS) was replicated on large scale with many of its elements incorporated in the Education Guarantee Scheme and Alternative and Innovation Education (EGS & AIE)[3]. As a result of the efforts made by the Central and State governments, '94 percent of the country's rural population has been provided with primary schools within one km and 84 percent upper primary schools within three kilometers. National Elementary Education Mission was conceived for facilitating the achievement of Universalisation of Primary Education (UPE) in a systematic sustained and integrated manner, involving all segments of society in this national endeavour'[4]

The Sarva Shiksha Abhiyan (SSA) is a concerted effort of the Government of India to provide useful and relevant elementary education to all children in the 6-14 age group by 2010. Another goal of SSA is to bridge the social, regional and gender gaps in education and give meaning to elementary education with active participation of community in the management of schools. The development of the SSA programme is an `offshoot' of many deliberations held at the level of policy makers and educationists of the country.

Objectives of SSA

The main objectives of SSA are listed below[5]:

- All children in school, Education Guarantee Centre, Alternate School, 'Back-to-School' camp by 2003;
- All children complete five years of primary schooling by 2007;
- All children complete eight years of elementary schooling by 2010;
- Focus on elementary education of satisfactory quality with emphasis on education for life;
- Bridge all gender and social category gaps at primary stage by 2007 and at elementary education level by 2010; and
- Universal retention by 2010

Thrust of SSA

A prominent feature of SSA is that it has a special thrust on making education at the elementary level useful and relevant for children by improving the curriculum and using child-centred and effective teaching-learning activities. As we know, in any educational activity, the teacher has a catalytic and critical role to play and SSA recognizes both these roles. *"SSA recognizes the critical and central role of teachers and advocates focusing on their development needs. Setting up of Block Resource Centers/Cluster Resource Centres, recruitment of qualified teachers, opportunities for teacher development through participation in curriculum-related material development, focus on classroom processes and exposure visits for teachers are all designed to develop the human resource among teachers."*[6]

Salient Features of SSA

Salient features of SSA are the following:

- A programme with a clear time frame for universal elementary education;
- A response to the demand for quality basic education all over the country;
- An opportunity for promoting social justice through basic education;
- An effort at effectively involving the Panchayati Raj institutions, School Management Committees, Village and Urban Slum Level Education Committees, Parent-Teacher Associations, Mother-Teacher Associations, Tribal Autonomous Councils and other grassroots level structures in the management of elementary schools;
- An expression of political will for universal elementary education across the country;
- A partnership between Central, State and the local governments; and
- An opportunity for States to develop their own vision of elementary education.

SSA aims at improving the efficiency of the delivery system and the quality of basic education (upto class VIII) and bridging the social, regional and gender gaps with the active participation of the community in the management of schools. This implies:[8]

- Institutional reforms
- Sustainable financing
- Community ownership

- Institutional capacity
- Improving mainstream primary and elementary education;
- Community-based monitoring with full transparency
- Habitation as a unit of planning
- Accountability to the community
- Priority to education of girls
- Focus on special groups

Sarva Shiksha Abhiyan realizes the importance of Early Childhood Care and Education (ECCE) and looks at the 0-14 age as a continuum. All efforts to support pre-school learning in ICDS centres or special pre-school centres in non-ICDS areas will be made to supplement the efforts being made by the Department of Women and Child Development.[9]

Thus, we can see that the SSA became a nationwide educational movement to provide access to education to all children in the specified age group by mobilizing and streamlining governmental agencies. Success stories are coming out from different states of Indian Union where SSA is in progress. These reflect our government's commitment to the Education for All declaration.

6.1 District Primary Education Programme and Distance Education

Rapid developments in distance education methodologies and their thrust on building effective learning environments have been widely discussed. From conventional correspondence learning to distance learning and now we are in the decade of online distance learning. This, in addition, provides independent and instant interaction. Technology cements the gap(s) between classroom learning and first generation distance education. Web-based distance learning is also chosen by traditional education providers to maintain uniform quality in the service provided and to enhance interaction among multiple sources.

MOU between MHRD and IGNOU under DPEP

In 1996, Distance Education was consequently chosen as a catalyst for expediting DPEP. An MOU was signed between MHRD and IGNOU in November 1996 and thereafter; a full-fledged office was set up at IGNOU for this purpose. This was followed by several activities in the DPEP states. A National Workshop on Professional Development of Primary Education Personnel through distance education was held in New Delhi in 1999 and an International Workshop on Professional Development of Primary Education Personnel was held in 2001. Some of the recommendations of the international workshop were the following:[10]

- Need assessment of the stakeholders be done prior to planning any multimedia packages;
- Involvement of stake holders, particularly primary school teachers, while preparing any material or training package with the help of experts from technology, media and concerned subject areas;
- Effective synergic match between technology and pedagogy with sensitivity to cultural specificity;
- Preparation of model multimedia training packages at national level as exemplary material for subsequent adoption by the participating states;
- Establishment of national web-based resource centre and multi channel forum; and
- Extensive use of Gyan Darshan

Initiatives for ICT

The first step towards the use of Information and Communication Technology (ICT) in DPEP was taken when two workshops were held in Bangalore and New Delhi to familiarize DPEP personnel in the use of Internet Access Device (IAD). Multimedia approach was used from the very beginning. Several video programmes were developed which were used in the training of

DPEP personnel. Self Instructional Materials (SIMs) were given importance for making them more learner-oriented. SIMs used in DPEP were

- Self-explanatory
- self-contained
- self- directed
- self-motivating and
- self-evaluating

Development of Resource Material

The participants developed draft SIMs. The learning materials presented at each workshop were designed in such a manner that the learner could provide feedback. Most of these SIMs were designed to evolve and reinforce responses that had some approximation to the terminal behaviour.[11] Audio and videos were also used in DPEP. Educational broadcasts were also started. As far as video programmes are concerned we can see these were used in four forms:

- Television programmes
- Video cassettes
- Cable TV (CATV) and
- Video CD

Video CDs have enormous potential to make teaching-learning process more effective. They provide unmatched opportunities for simulation of reality within a controlled instructional setting. They have the following characteristics:

- Automatic frame stop
- Frame Number
- Adjustable forward and reverse timings
- Still frame, and
- Interaction [12]

Teleconferencing Programmes

Similarly, teleconferencing programmes were also organized in different states. These were organized on different themes and concerned issues, these may be classified into four broad categories:

- Building awareness
- Contextual issues
- Curriculum areas and
- State specific needs

Development of Interactive Website

An interactive website was also launched in the state of Kerala: www.keralaprimaryeducation.org. This website was a major achievement of DPEP in Kerala and it had the following features: [13]

- Curriculum database
- Bulletin board
- Interconnectivity
- Calendar of events
- Collaboration projects

- Online courses
- Registration
- Search
- Related links, and
- Target audience and beneficiaries

Distance Education Programme under SSA

Distance Education Programme (DEP) is one of the major interventions under SSA, which focuses upon 'strengthening training through distance learning.' SSA calls for a large number of teachers and other personnel who need to be trained to bring about qualitative improvement in elementary education. Since face-to-face approach or model would not be adequate to carry out this enormous task of training, DEP becomes a relevant and practical mode to facilitate the training of teachers and other functionaries under SSA by providing them distance learning inputs and materials.

As envisaged in the framework for implementation of SSA, 'the distance education mode will continue to be an important input in the in-service education of teachers and other personnel in the area of elementary education. It will supplement the face-to-face training by using multimedia packages like audio-video programmes, radio broadcast, teleconferencing etc. This will also facilitate dissemination of innovative practices of one region to others'.

6.2 Information and Communication Technology (ICT) for Improvement of the Expertise of Teachers

ICT-enabled distance education is poised to be a change agent in the academic scenario of the world. This would not only meet considerably elementary education needs of the developing countries but also increase dependence of education on ICT. Technological development always implies transition to newer technologies and the cost involved for such switch over should be viewed as investment.

ICT for Developing Countries

One may ask 'How in view of their limited resources the developing countries can afford ICT and ICT-enabled education'. It can be argued that these need huge investment that can otherwise be utilized for infrastructure development. But we should realize the fact that ICT-enabled education can reach more learners including the deprived learners in far-flung areas, which can transform educated human power that can significantly contribute towards social development. This should be the guiding principle for us while opting for ICT-enabled education.

ICT in Education

The use of ICT can effectively enhance learning where traditional models have failed. While these technologies offer advantages, they also pose challenges. Several studies have been conducted in the West about the use of ICT for middle and high school students. Martin Carnoy [14] conducted a painstaking study on this and its results were described by him in his inaugural lecture on "ICT in Education: Possibilities and Challenges Academic Year 2004-05". According to him, *"Using ICT as a supplement to improve test score results, may, however, be seen to be more effective than traditional teaching alone, hence is much more applied"'*

ICT in Teacher Training Programmes

Martin Carnoy also comments about the use of ICT for training teachers and administrators. 'Private firms such as Sylvan quickly saw the potential of ICT as an in-service training medium for teachers, and this now forms an important part of Sylvan's extensive ICT learning system An entirely different approach to teacher improvement is web access to course content, lesson plans and network to other teachers. This <<database >> or content approach is used by Net Schools and the IBM Foundation. Both of these organizations focus on using ICT in teacher training for course content rather than improving pedagogy.[15] It can be seen that ICT enabled distance learning has been employed in the education of teachers both at pre-service level and at in-service level. UNESCO[16] has published a summary of case studies conducted in nine countries in different parts of world and most of these studies reflect the necessity of having multi-pronged strategy for teacher education and for improving their expertise. For example, 'in China television has been used tremendously for teacher education. In India, there is a multimedia approach for teacher education. In UK, due to heavy shortage of teachers of Mathematics and Science, the Department of Education invited tenders.....the Open University was successful in this and the result was Open University's Postgraduate Certificate of Education (PGCE) programme, where ICT played a large role in enabling interaction between students, tutors, regional support centres and programme providers '[17]

6.3 Multimedia Content Generation: Concept

"Content is the data that appears between the starting and the ending tags of element in an SGML or HTML or XHTML document. The content of an element may consist of plain text or other elements'.[18] We can see that an element is the combination of a set of tags any content contains in between two tags and any attribute the tags may have. Elements can be nested one with the other.[19] Multimedia content includes different components like text and unformatted documents, formatted documents, images, audio file format etc. As we know, information can be stored in any format including text, image audio and video. If the content of resource is in more than one medium and integrated into one, it is called a multimedia resource. Thus, 'multimedia is the process of integrating different types of media into one format, in a sense which combines full motion video pictures, sound recording and text into a single package that can be accessed by the user in a variety of ways. This process can be used for any type of application ranging from training systems, corporate presentation programmes, interactive information kiosks and retail CD ROMs'.[20]

Multimedia, if applied, mixed and measured, can make learning very interactive. We can make conventional learning attractive, motivating, and captivating if multimedia content can be used in SSA. Multimedia content can draw attention as well as affect high memory retention among learners. Other advantages of multimedia content are its flexibility, creativity, powerfulness and cost-effectiveness. Multimedia content is flexible in the sense that it is easy to update the content in an inexpensive way within a short period. It is creative in the sense that it allows for the development of a highly effective communication tool. It is cost-effective in the sense that mass CD ROM replication can be done at very low cost and digital materials can be easily updated without whole scale reproduction. Of late, 3D graphics and animations have been used extensively as tools to capture and hold the attention of young viewers.

6.4 Content Development and Kind of Multimedia Learning Packages

'Multimedia learning objects have been shown to be effective motivators in various instructional settings and enhance student motivation, engagement and learning'.[21] Even though there are many multimedia-authoring tools for instructional purposes, the educators face a dilemma. 'On the one hand they have a classroom full of multimedia-hungry students with short attention spans, on the other hand, they have heavy teaching loads including test coaching and evaluation, which do not leave them sufficient time to master multimedia-authoring tools or to search for the content material.[22] Several multimedia learning packages are available in developed countries. Some of these learning packages are ViZiPEN (Virtually Zero Input Presentation Environment), MERLOT, BELLE (Broadband Enabled Lifelong Learning), ELM-ART etc. "ELM-ART is a web-based tutoring system providing adaptive navigation support by annotating links and adaptive sequencing".[23]

Programming Languages of Multimedia

Multimedia content can be developed with the help of programming languages like HTML, XML, DHTML and ASP. HTML stands for Hyper Text Mark-up Language. It is a structured mark-up language that is used to create web pages. HTML24 is nothing but a collection of codes termed as elements that are used to indicate the structure and format of a document. Elements in HTML consist of alphanumeric tokens within angular brackets, such as , <html>, <body>, etc. Most elements consist of paired tags: a start tag and an end tag. For example, , a start tag and is the end tag. The end tag is similar to start tag except that the symbol is preceded by forward slash. An element's instruction applies to whatever content is contained between its start and end tags: e.g. . This text is boldbut this text is not. Element names are not ease-sensitive. An element such as <HTML> is equivalent to <html> however, using either upper or lower case consistently makes HTML documents easier to understand and maintain. Element names cannot contain spaces. XML stands for Extensible Mark-up Language.

Criterion for Development of Multimedia Content

The chief criterion in developing and making content available is to make it useful and available to target audience or the end users. According to Jan Spyridakis, the main criteria to be considered in content development are the users' reading processes, effective text strategies, providing content and internationalization in hosting and presentation of ideas.[24] We can see that there are five guidelines that describe effective text strategies.

- Selecting and presenting context
- Organizing content on the page
- Manipulating style
- Establishing credibility
- Communication with international audience

The main aspect to be remembered in content development is the organization of content on web page. Group information to help readers create hierarchal framework for storing incoming information in long term memory.[25] As far as the style of the web page is concerned, we have to use words that readers can easily and accurately understand. We have to always think that we are communicating with a varied audience. Therefore, we should use a style that is culturally generic and easily translatable. Finally, to establish credibility for the content we can give the following:

- always furnish the author's name, credentials and e-mail address
- date on which the site was posted and last updated
- citation of sources when appropriate
- statement regarding website use of readers' personal information
- up to date information
- accurate information
- lack of types, grammatical errors and spelling mistakes
- lack of hyped-up language

Development of HTML Based Document

The authors have prepared an HTML document for the development of multimedia content on an interactive CD to teach a lesson on 'Water' for Class VI students. They have included components of multimedia like image, audio and dynamic effects so that an SSA resource person can use this interactive CD for reaching the above target audience. In this CD, the sound of waterfall, sound of flowing water etc. along with necessary visuals has been included. Such CDs can be posted in the website of SSA/IGNOU so as to maximize content sharing. Translated versions of this content can be made, using the software of Mantra developed by the C-DAC, Pune. This technology helps us invoke online translation of any Indian language texts on web.

Translation can be made using Mantra's innovative computational and grammatical solutions. What we need is to hyperlink these language files to the home page index. As a result, repetition of the generation of same multimedia content in different languages, which is expensive, can be avoided. However, due to economic reasons, we are unable to procure Mantra translation software and therefore will be unable to demonstrate this aspect.

6.5 Topic: The Story of Water**

This is the text of the document developed by the authors as an exemplary based upon HTML.

Unit 1: Water – General Introduction

Water at room temperature is a colourless, odourless and tasteless liquid. It is essential to all known forms of life. It is even believed that life originated in water. Have you ever thought why there is no life on the moon or the Saturn? It is the absence of water that prevents life to evolve on other planets. Water makes up the largest proportion in the living body. Almost 75% of the human body and 90% of any vegetable body is water!

Unit 2: Sources and Types of Water

- *Surface water*: Water present in lakes, pools, rivers and tanks is surface water. This is only 0.01% of total water resource
- *Underground water:* It is the rainwater that goes down inside soil and rocks below the water table. About 98% of the fresh water on earth lies below its surface.
- *Saline water*: Rain water or water from melted snow passing through salt containing rocks carries salts to the ocean, making it salty. This is saline water.
- *Sweet water*: Precipitation of water from the atmosphere runs down to the earth. This water does not contain salt and suspended particles. This is the best source of water for consumption; it is also called as sweet water.
- *Potable and non-potable water*: Water good for drinking is called potable water and water not fit for drinking and good only for washing utensils, clothes, irrigation etc is called non-potable water.
- *Hard water*: Water that contains calcium and magnesium sulphates, chlorides or bicarbonates, which does not allow soap to lather freely is called hard water.
- *Soft water*: Water that does not contain calcium or magnesium and which allows soap to lather is called soft water.

Unit 3: Importance of Water

Water is so important that if we don't drink water for four days we may die, whereas we can manage to live without food even up to ten days. Children like you should drink at least four glasses of water daily. You should tell your parents to drink at least two litres of water a day. We give water to the cattle. Have you not heard the story of a thirsty crow cleverly drinking water from a pot? We water plants in our garden regularly. What happens if we don't do that?

Water covers about 71% of the total surface area of the earth, which we know is more than the land area. Most of it is in ocean, about 97%. Almost 2% of water is stored in the form of ice. Only 1% is available as fresh water in the rivers and ponds.

** *Content of this topic has been mainly taken from the science textbook of Class VI of the West Bengal Board, written by Dr B.N.Sanyal and A.K.Chatterjee. We acknowledge our gratitude to the authors.*

Unit 4: Sanitation and Public Hygiene

We use water in our everyday life. If water is clean and not contaminated we can be sure of a healthy life. We should see that we always use clean water. Have you ever thought why we do not drink water directly from a dirty pond? What are those large water tanks constructed in the cities and towns for?

We get up in the morning, brush our teeth and take bath. We use water in the toilet. I don't defecate in the open space, because I know it is unhygienic. Talk with your friend and find out whether she has a latrine attached to her house.

Unit 5: Pollution of Water

We call water polluted if it has harmful effect on humans and other aquatic plants and animals. Polluted water can cause many dreaded diseases like typhoid, cholera, diarrhoea, hepatitis etc. The following are the common causes of water pollution:

- *Sewage*: Water containing domestic and municipal waste is known as sewage. This is the greatest source of contamination of ground water and carries organisms like viruses, bacteria and parasites
- *Industrial effluents*: Industrial waste from tanneries, mills, factories, refineries etc pollutes water with oil, grease, plastic, chemicals, metallic wastes, toxins etc. Mining waste discharges like lead, copper, mercury etc are also harmful to our health.

Unit 6: Water-Borne Diseases

Some of the most common water-borne diseases are the following:

- *Typhoid*: The bacillus *Salmonella typhi* causes this disease. It is excreted in the stools and urine of the affected person. The infection spreads through soil, water, food and flies. By not drinking contaminated water we can prevent this disease. TB vaccine provides protection to children like you. Find out from your guardian when you were last given the two doses of this vaccine. You must have been only 5 year old then.
- *Cholera*: The bacterium *Vibrio cholerae* causes cholera. The infection spreads through water or food contaminated by the bacteria from the stool of the patient. Dehydration is very dangerous. Oral dehydration (ORS) can be done at home.
- *Amoebiosis*: The protozoan *Entamoeba histolytica* causes amoebiosis. Infection occurs through contaminated food and water. By improving sanitation, we can prevent the disease.

Unit 7: Water: Some Facts

- About 1,200 millions people spread across 40 countries do not have access to safe drinking water.
- It is predicted that water may be a cause for wars between various countries in future.
- Agriculture takes 69% of all the water withdrawn for human use, and industry 23% only. 8 % is used for domestic use.
- More than 10,000 species of fish have become extinct in recent decades.
- Daily water use per person is 600 litres in residential areas of North America and Japan and 300 litres in Europe whereas it is only 10 litres in Sub Sahara region. In India we use around 50 litres a day.

Unit 8: Self-Check Exercise

1. River water is an example of ....water.
2. Salinity of seawater is caused by.................
3. ....percent of the human body is water.
4. Maximum fresh water lies below................
5. People living in.........................use maximum fresh water.
6. Typhoid is caused by......................bacillus.
7. .... are caused by polluted water (Name two diseases).
8. Water containing domestic and municipal waste is known as ....
9. Water good for drinking is called .... water.
10. Water that contains calcium and magnesium sulphates, chlorides or bicarbonates which does not allow soap to lather freely is called ....

Unit 9: Answers

1. Fresh
2. salt
3. 75%
4. the surface of earth
5. North America and Japan
6. Salmonella typhi
7. Typhoid and cholera
8. sewage
9. potable
10. hard water

6.6 Conclusion

In this write up, the authors have discussed the development of multimedia content for the purpose of creating an interactive CD or hosting an interactive web document on the website of SSA. Using Mantra technology to submit or receive online instant translation that can tremendously help in content sharing has also been mentioned. Multimedia learning packages including BELLE and ViZiPEN were also mentioned. Strategies need to be chalked out for enabling teachers to handle basic multimedia authoring tools. It is hoped that quality and cost-effective educational opportunities reach millions of children who remain out of school for whatever reasons.

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CHAPTER 7

INTERACTIVE RADIO INSTRUCTION: INITIATING FOR CHANGE IN TRIBAL SCHOOLS OF CHHATTISGARH — A CASE STUDY

M. Sudhish

Abstract

The present paper is a brief presentation about an ICT project in Chhattisgarh. It gives details of how externally assisted project paved its way in the newly formed state to provide technical support to bring about a pioneering change for education of socially marginalized groups. As per the state's need and requirements, EDC introduced the Interactive Radio Instruction method in the state, developed the capacity of the state persons and made the programme suitable to the needs of the local people. The introduction of this innovative programme not only supported teachers to give up the traditional method, but also gave strength and support to new pedagogical theories. The project is in its mid-way and its mid-term evaluation, done recently, has given encouraging results.

7.0 What is EDC?

Education Development Centre (EDC) is an international non-profit organization that has been a pioneer in building bridges between research, policy and practice in the field of education for the last four decades. EDC has been chosen to execute the dot-EDU T4 programme in India, in cooperation with the Government of India and the various State Governments. EDC has been working for the development of education across the world in more than 60 countries for the four decades and has been adjudged as the 'Leader with Associates' for its dot-EDU by United States Agency for International Development (USAID). EDC has its international office at Washington DC.

Promoters of EDC in India

EDC operations in India are promoted and funded by United States Agency for International Development (USAID) with active cooperation from Academy for Educational Development (AED) and Georgia Institute of Technology. EDC is working in consultation with the state governments and is currently working with over 40 Indian organizations across three states.

Aims of EDC

EDC aims to strengthen society of various aspects like early child development, K-12 education, health promotion, workforce preparation, community development, learning technology, basic and adult education, institutional reform and social justice.

EDC in India

Based at Bangalore (Karnataka), it has extension offices at Raipur (Chhattisgarh) and Ranchi (Jharkhand) for facilitating production and implementation of T4 project initiatives. EDC has been working in India since 2002 and has initiated educational TV and Interactive Radio Instruction (IRI) programmes under its T4 project. Its primary goal is to work with local groups to use technology to improve the quality of education in primary schools.

Project Areas of EDC in India

The dot-EDU activities are being implemented in three development blocks each in three states viz. Karnataka, Chhattisgarh and Jharkhand. In Chhattisgarh three development blocks, namely Abhanpur of Raipur district, Kanker of Kanker district and Kondagaon of Bastar district have been selected where the IRI programme is being run in 100 schools in each Block.

7.1 DOT-EDU T4: Multiple Learning Channels to Attain Education For All

India's 2001 Census counted over one billion people as its population. Between 1991 and 2001, its population grew by 21.34%. At the local level, such growth poses a considerable challenge to India to provide education and promote literacy, particularly in rural areas. Over the past decade and in tandem with the Education for All (EFA) Declaration, India has taken significant steps in improving literacy rates and education through ICTs. Technology *Tools for Teaching and Training (T4)* in India project will provide teachers with in-service training to improve content and methods, and multichannel instruction in English, Mathematics and Science using media ranging from interactive radio to a mobile video unit. The dot-EDU Technology Tools for Teaching and Training Initiative represents an extremely innovative and ambitious effort to meet India's challenge to provide primary education to all its children. If successful, it will not only reach formerly underserved populations, but also become an educational model for other developing nations.

7.2 The Project in Chhattisgarh

The T4 initiative, supported by USAID and funded through the dot-EDU project, endeavours to improve the quality of education in the states of Karnataka, Jharkhand and Chhattisgarh. The representatives from EDC made frequent visits to Chhattisgarh to plan the activities in the state. They interacted with the officials, AIR personnel, teacher educators, NGOs, SSA functionaries, school teachers and community leaders in order to identify the need areas where a mutual sort of support is required.

The Government of Chhattisgarh took a major decision by introducing English from Class I just after the formation of the state. Everyone welcomed this decision but there was a need to implement this decision successfully in all schools. Initial level face-to-face training sessions were organized but they were not sufficient keeping in mind the number of teachers and their proficiency in English and the required continuous support in the language learning process. The state government finally agreed to plan the activities to improve the quality of the teaching of English in the state. The EDC developed a proposal to introduce the Interactive Radio Instruction (IRI) programme. Interactive Radio Instruction (IRI) Programmes were planned to be produced for introductory English, in collaboration with the State Government and local NGOs for use at the primary school level. These were planned to start a pilot project with broadcasts in selected blocks of Raipur, Kanker and Bastar districts. It was decided that after successful completion of the project, it can be expanded to the tribal and other regions of Chhattisgarh.

7.3 Use of ICT under DPEP

Before the launch of T4 Initiative, some small-scale practices were already in existence in the field of education. "Anugoonz" a daily 15 minutes broadcast in the evening and weekly one-hour interactive programmes for the counselling of teachers on various issues were in operation. At the same time there were some programmes in tele-conferencing mode. Teacher training institutes were provided with the equipment and dish antennae for receiving these telecasts.

After the introduction of District Primary Education Programme (DPEP) in the state, technical support in the field of ICT was made available through the Distance Education Programme-District Primary Education Programme (DEP-DPEP) of Indira Gandhi National Open University, New Delhi. DEP-DPEP tried to build the capacity of state for using ICT in education. On the basis of the experiences gathered and the need to serve such a large area with marginalized community with the limited resources, it was decided to use radio during the first phase. It was decided that after getting the hands-on experiences in using radio in classrooms, the state could later on opt simultaneously for more sophisticated technology and earmark budget for it in the following years. EDC agreed to the proposal to kick start with the radio project and started acting accordingly.

7.4 Interactive Radio Instruction (IRI)

Various distance education institutions in India for the last four decades have used radio broadcast. Indira Gandhi National Open University (IGNOU) made a humble beginning at broadcasting radio programme for its students in 1990 through selected radio stations. The service remained a one-way until May 3, 1998 when for the first time since its inception in 1985 IGNOU launched its interactive radio counselling (IRC) pilot project from All India Radio (AIR) station, Bhopal. One-hour interactive sessions for its students enrolled in the Bachelor Preparatory Programme (BPP) and Management Studies Programme (MS) residing in and around Bhopal, capital of a Madhya Pradesh was started twice a month, that is, on every second and fourth Sunday.

Bases of IRI

Interactive Radio Instruction is based on certain strengths and limitations of radio as a unisensory medium, as given below:

- Radio broadcast has the inherent strength of outreach to the masses and is an affordable medium for both distance education institutions and its students;
- Used at the local level, it can cater to the area-specific needs of the students and involve them in selecting problem areas for discussion;
- The decentralized approach of local broadcasting can develop a sense of intimacy and warmth between the resource persons and the students;
- The disadvantaged groups—poor, physically and visually challenged, and women—who find it difficult to attend or participate in face-to-face academic counseling sessions can be reached through interactive radio counseling;
- The use of local languages for interaction can help more diligently students understand difficult concepts discussed in their courses and can motivate them to pursue their studies;
- As interactive radio counseling or interaction is designed in a decentralized way, follow-up interaction (either face-to-face or by telephone) with the resource persons and among the students can be strengthened. This can motivate students to form self-help groups;
- IRI sets up interaction in the classroom through a well-designed instructional technique which requires that students increase their active participation in learning;
- IRI organizes activities within the radio broadcast time and strategically places pauses throughout so that teachers and students can perform actual exercises with the radio; and
- For learning English, this approach is especially useful because students may not otherwise have the opportunity to hear English and be guided about correct articulation of sounds and use of English language.

How It All Began?

When the decision was made to use radio and that too for beginners, the next question was how to go for it and where to start. To finalize this, the staff of EDC, Washington visited different districts of the state along with the functionaries of Sarva Shiksha Abhiyan. After intensive interaction and receiving suggestions from various sectors, it was decided that the project will be launched on a pilot basis in 100 schools each of *Abhanpur block of Raipur/ Kanker block of Kanker and Kondagaon block of Bastar districts.*

The next step was to set up an expert group to implement the Interactive Radio Instruction Programme as per needs of the state. A group consisting of about 20 people from different streams like NGOs, experts from DIETs and SCERT, school teachers and content experts were invited and discussions were held for finalizing the roadmap for project implementation.

The IRI experts demonstrated various models and discussed even small details to ensure successful implementation of the project. The names of characters, their characteristics, the storyline, different local games played by the children were also discussed and information on different areas was gathered to give the project a complete local touch according to the need of the target group. This group was given details of the interactive programmes' and also the opportunity to go through various scripts and develop their own scripts. The EDC team brought with them some of the master plans and after long discussions and detailed analysis, the state decided to follow a specific pattern to suit the local needs of teachers as well as students. In this way, the master plans were given the final shape with the help of local curriculum developers and IRI experts.

Establishing a Digital Studio

To produce different programmes, it was decided at the initial stage, to hire a private digital studio and side by side establish a dedicated digital studio. This studio with latest equipment was established in the SCERT premises. It was decided that after the completion of the project, this studio will be gifted to the state. The setting up of the studio is a good example of partnership between different agencies. The premise was offered by the SCERT, construction cost was borne by Sarva Shiksha Abhiyan and the equipment and technical support was provided by the EDC itself.

Setting Up of State Office

When the work started expanding, it was decided to start an office at the state level. EDC had its base office in Bangalore with a country Director and staff. Two extension offices were opened in Raipur (Chattisgarh) and Ranchi (Jharkhand) to monitor the activities in the state. A building was hired near the studio and a small full-time staff was deployed.

Development of Scripts to Suit Local Needs

While developing scripts, the following considerations were kept in mind:

i) Our textbooks sometimes lack material, which relate to the life and experiences of rural children. Most examples and illustrations are from the urban children life and relate to urban children. This gap could be filled through inputs provided by IRI scripts.

ii) The materials produced must address the specific academic needs of rural tribal school children; they require focusing on concepts that children find difficulty to comprehend; and they should be culturally relevant to rural school children.

iii) The scripts need to build the capacity of teachers and education personnel in schools through professional development in the area of pedagogy, conversation skills, conducting various classroom activities, using child-centred approaches and other inputs to improve their knowledge in the content areas. The IRT scripts were designed to support a set of inclusive practices and in the classroom, schools and teachers that may help improve education for all students, including students with disabilities, and

iv) The IRI scripts were so designed so that these could lay stress on gender and social equity to be realized in our classrooms. These could also help in difficult-to-reach or out-of-school population.

Steps in Developing IRI Programmes

The following steps were implemented in developing IRI programmes:

Audience Research

All successful projects are based on the knowledge, how well they are performing. Audience research was carried out in the project area to understand the needs, interests, likes and dislikes of the students and teachers, their current level of education, the level of teachers training and the types of stories, games and characters that were culturally significant and engaging.

Developing Master Plans

The next step was to develop Master Plans. A master plan guides the scriptwriter about the learning objectives, script content, instructional strategies, programme structure, stories and local activities to adapt.

Script Writing

Script Writing was the next and perhaps the most important step. It required lots of imagination, knowledge of content of child psychology and also of pedagogical principles. The scriptwriters should know about the classroom atmosphere and the details of the various characters. The scripts were edited with the help of the IRI experts.

Recording

After the script writing was completed, recording started. This is also called the production part. The script was recorded in the digital studio. Professional artists performed the script under the direction of the producer.

Formative Evaluation

After production, each script was evaluated in selected schools by the field evaluators. They observed the effectiveness of the programme, whether there was adequate active participation and made suggestions for improving the programme. On the basis of these suggestions, the script was again revised and re-recorded.

Broadcast

Finally, the programme was given to AIR for broadcast. These programmes could be listened to in schools either through audiocassettes, CDs or through radio. The broadcast fee was paid from SSA fund under the innovation head for SC/ST children.

Learning to Listen: On the Road to Quality

In this way, IRI programmes reached the classrooms. The teachers were given training, provided with the reading materials well in advance; their performance was supported and motivated by different expert groups and impact studies were conducted to assess the progress and further improve the programmes. The students were thus exposed to the English language and they were given ample opportunity to listen, act and produce the language in their day-to-day situations. The community was also involved actively so that programme monitoring could be done effectively and support could be sought from the community for its successful implementation. Some of the effective techniques through which the IRI scripts provided opportunities for interaction were as under:

Translating what is announced through radio

Teachers were requested to translate various instructions in local dialects.

- *Pauses for teachers:* Scripts offered opportunities to teachers to explain some concepts in their own way.
- *Pauses for students:* There were pauses for students during which they are expected to answer some questions or carry out some activities.
- *Individual and group work:* Radio offered an opportunity for the listeners to do individual and group work.
- *Games:* Various local games were identified and included to make the listeners learn the language through games.

7.5 Mid-Term Evaluation

Mid-term evaluation of the project was done under the guidance of James Michael Royer of the University of Massachusetts, Amherst and the results were encouraging. Details of the evaluation are given below:

Sampling

Table 1: Number of schools and number of students in Chhattisgarh demographic and intervention-wise

	Rural	**Urban**
Treatment		
IRI		
Number of Schools Tested	20	4
Number of Students Tested	428	80
Total Number of Schools Tested = 24 **Total Number of Students Tested = 508**		
Control		
Number of Schools Tested	15	2
Number of Students Tested	283	40
Total Number of Schools Tested= 17 **Total Number of Students Tested = 323**		

Test Results

Mid-test performance and gain from pretest to mid-test are given in Table 2 which shows the percent correct answers on both comprehension and speaking pretest and mid-test. Table 2 also shows the amount of gain from pretest to mid-test on both the tests as a result of intervention.

Table 2: Percent correct answer on comprehension and speaking pretest, mid-test, and pre-test to mid-test gain as a function of intervention treatment

Intervention		Percent correct on comprehension pre-test	Percent correct on speaking pre-test	Percent correct on comprehension mid-test	Percent correct on speaking mid-test	Gain in comprehension pre-test to mid-test	Gain in speaking pre-test to mid-test
IRI	Mean	**14.2023**	**2.4051**	**34.0000**	**15.7258**	**21.2000**	**12.5000**
	N	257	246	125	124	125	124
	SD.	15.23404	5.98818	17.14208	9.09213	18.25447	9.99661
Control	Mean	**18.2813**	**2.9605**	**26.6204**	**14.0909**	**9.0278**	**9.8485**
	N	160	152	54	55	54	55
	S.D.	15.66700	5.94368	17.51790	8.76545	16.18304	9.22553
Total	Mean	**15.7674**	**2.6173**	**31.7737**	**15.2235**	**17.5279**	**11.6853**
	N	417	398	179	179	179	179
	S.D.	15.51050	5.96984	17.53898	9.00026	18.47977	9.81729

Table 2 shows that the IRI group made greater gain than the Control group on both comprehension test and speaking test, with the gain on comprehension test being particularly striking in that the IRI group made double the gain over that of the control group.

Performance of Boys and Girls

The next set of analyses (Table 3) examines whether intervention treatment played a role in the extent of gain made by boys and girls on the two tests. The Table 3 shows that the girls made slightly higher gain than boys on the comprehension test if they were in the IRI group, compared to the gains in the Control group. However, this difference is not significant.

Table 3: Pre-test to mid-test gain on comprehension and speaking tests as a function of student sex and intervention treatment

Intervention	Student sex		Gain in comprehension pre-test to mid-test	Gain in speaking pre-test to mid-test
IRI	Male	Mean	**18.9516**	**12.1693**
		N	62	63
		S.D.	17.04952	10.56485
	Female	Mean	**23.4127**	**12.8415**
		N	63	61
		S.D.	19.24639	9.44940
	Total	Mean	21.2000	12.5000
		N	125	124
		S.D.	18.25447	9.99661
Control	Male	Mean	**7.4074**	**9.7222**
		N	27	30
		S.D.	14.81426	9.56009
	Female	Mean	**10.6481**	**10.0000**
		N	27	25
		S.D.	17.57665	9.00103
	Total	Mean	9.0278	9.8485
		N	54	55
		S.D.	16.18304	9.22553

Performance on Tests as a Function of Urban or Rural Schools

The results reported in Table 4 show student performance analyzed in terms of whether the students are enrolled in an urban or a rural school. As can be seen in Table 4, rural students make considerably higher gain than urban students. However, this data should be interpreted with caution given that the relatively small number of students in the urban groups would suggest that they are from a single school.

Table 4: Pre-test to mid-test gain on comprehension and speaking tests as a function of school location (Urban or rural)

Location		Comprehension pre-test to mid- test gain	Speaking pre-test to mid-test gain
Rural	Mean	18.9167	11.8009
	N	150	149
	S.D.	18.01476	9.97842
Urban	Mean	10.3448	11.1111
	N	29	30
	S.D.	19.49959	9.11120
Total	Mean	17.5279	11.6853
	N	179	179
	S.D.	18.47977	9.81729

7.6 Suggestions

For successful implementation of the programme, the following considerations merit attention.

- The demand for the programme should come from the would-be beneficiaries.
- Each programme should be made keeping in mind the aptitude and interest of the target group.
- There must be a provision for the time-to-time live interactions with the target group. At least one phone-in programme every month should be broadcast.
- To motivate the students and teachers, some programme should be recorded with the help of teachers and students of the schools performing better than others. They should deliver some programmes based on the lessons they learned through the radio programmes.
- In order to make the programme popular, there should be sufficient publicity campaigns.
- Special programmes can be developed that focus on special occasions like Deepawali, Teachers' Day and Independence Day without breaking the sequence of the programme.
- Each script should be thoroughly checked and the formative evaluation of each programme should be done to weed out the mistakes.
- Teachers need to be informed about what they are going to learn, why the topic is important for them and its link with other topics in the course, and the prerequisites needed to learn the topic.
- The reach of IRI should be made ensured to disadvantaged groups such as the poor and the physically and the visually challenged who can take advantage of the aural medium to increase their knowledge.

- Different methods and strategies need to be used to bring liveliness and spontaneity to IRI sessions. The sessions should be organized in a relaxed atmosphere. Humour, if pedagogically valuable, can be added to make students comfortable in terms of thinking, feeling, laughing, listening, and learning.
- As learning from interactive radio is a new experience and relatively unfamiliar to most students, they need to develop learning techniques that are different from those required for learning from print or teacher-based learning.
- There is a need for systematic monitoring and evaluation of each element of the IRI service. All the personnel involved in planning, designing, implementing, and evaluating the programme should receive constructive feedback on a regular basis and at each stage of IRI, which can be translated into action. Research needs to be made an integral part of the system, providing two-way communication to all the stakeholders.

7.7 Conclusion

A pilot IRI project in Chhattisgarh has provided opportunities for interactive radio programmes to be used both for teachers and students to improve the quality of primary education. Teaching of subjects like Science, Mathematics and English as a second language suitable to the local cultural environment would definitely improve content learning through IRI.

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CHAPTER 8

PRIMARY TEACHERS' INVOLVEMENT IN DEVELOPMENT OF EDUCATIONAL AUDIO LEARNING MATERIAL*

Madhvi Devendrabhai Shukla

Abstract

This study describes an experiment conducted by Educational Technology (ET) Cell of DIET, Rajkot (Gujrat) wherein audio cassettes on children's' action songs and story-telling were developed by teachers of primary schools for students of standards 1, 2 and 3. Select prayers were also a part of the content. These audio-cassettes were developed through" a workshop in which 113 primary teachers participated. A follow-up study using these audiocassettes was also conducted by ET cell. DIET, Rajkot. The paper concludes with observations about teaching and learning with the help of these audiocassettes and their possible use at students' homes.

8.0 Introduction

As a part of the implementation of National Education Policy 1986, District Institutes of Education and Training (DIETs) were established in different states at district-level under the control of State Councils of Educational Research and Training (SCERTs). These training institutions play a seminal role in improving the quality of primary education besides their main function of imparting pre-service and in-service training to elementary school teachers. SCERTs also undertake other activities like educational research, development and spread of new techniques and good educational practices through its DIET.

Since its inception in 1994, District Institute of Education and Training (DIET) Rajkot (Gujarat) has been developing and taking new initiative which are evident from its noteworthy activities. The major function of the Educational Technology (E.T.) cell is to prepare audio-video materials. This ET cell also takes up the tasks of preparing audio programmes for broadcasting and imparting training pertaining to preparing audio-video programmes. To make teaching-learning techniques effective, these cells does not confine its activities to different types of materials (like printed text, audio-video cassettes, etc.) but also encourages primary teachers to use them in their classrooms.

Functions of E.T. Cell, DIET, Rajkot

The following are the functions of ET Cell of DIET, Rajkot.

- Development of educational audio cassettes.
- Imparting training to academicians, professors, instructors, trainees and teachers in respect of radio-talks, radio-lessons and their broadcasting.
- Preparing VCD material.
- Development of printed material in the form of modules.
- Facilitating computer-aided learning (CAL).

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8.1 Background

The approach of minimum levels of learning (MLLs) has been implemented in the primary schools in Gujarat state since June 1994. During 1998-99, activity based, joyful learning and competency based approach was implemented by G.C.E.R.T., Gandhinagar (in standards.1, 2, 3). In this context, the textbooks for students and their teachers' editions are being prepared one after another every year. All the teachers are being trained to implement the approach. Under this approach the teacher has to ask children to sing rhymes (Bal Geet) and say prayer with actions. He/She has also to carry out games and other creative activities before teaching a lesson. This implies that every teacher must have sufficient knowledge of such activities and it is necessary for her to have the ability to plan, carry out and supervises such activities in the classroom.

Follow-up of MLL Approach in Schools

i) Songs and story telling competitions were planned for all the teachers of the district (District Panchayat + MSB) by the E.T. Cell of DIET, Rajkot. The main purpose of organizing these competitions was to scan the skills of teachers in relation to these activities. There were 113 teacher-participants from the entire district, out of them 55 teachers participated in action songs competitions and another 58 in story telling. The female faculty of DIET, Rajkot worked as the panel of judges for both the competitions.

ii) After the competitions, it was felt that the teachers were very much in need of training. They must know how to implement the MLL approach, organize and conduct songs with action and story telling song in the classroom. It was also observed that they must be provided with literature and other material (printed, audio-video cassettes etc.) for their guidance in the matter.

iii) Audio cassettes of poem in the textbooks had already been distributed to each school by G.C.E.R.T., Gandhinagar. These aimed at creating reference literature in the form of audiocassettes and making it available to the schools. The Educational Training Section of DIET, Rajkot took up the matter and initiated production of these audio cassettes for Standards I, II and III which could be used as reference material (literature) for children's songs and stories (Bal Geet and Bal Vaarta). While visiting the school, it was noticed that the children were very weak in saying prayers, singing songs and giving performance on vocal and instrumental music. There do not exist any music schools in rural areas, even if there were one or two, these were exceptions and very few children joined these. Besides, the teachers were also not proficient enough to teach music, singing, playing musical instruments, tunes, rhythm, or even correct way of saying various prayers. Prayer and singing programme are the essence and core element of a primary school. As an attempt to develop teacher's capability and expertise in the field, the E.T. cell of D.I.E.T., Rajkot used the following audiocassettes.

Sl. No.	Name & details of an audio cassette	Prepared for the std.	Topics covered	Derived values
1.	Hurrah...lilla....lai (C-60) Poems (Bal Geet) of Eminent Poet Shri Rameshbhai Parekh	1 & 2	Birds, butterflies, animals, festivals, seasons, family, etc...	Love towards nature, creatures and her. social & cultural behaviour, humanity, etc...
2.	Chaki ni chak chak (C-90) Poems & stories	2	India, Tiranga, habitants & life styles of birds & animals, food habits, sports, etc...	Environmental & health awareness, national unity & integrity, good manners, etc...

3.	Dost Chalo.... (C-90) Poems (Bal Geet)	3	Lord Ganesha, Civilization of India, clock, television, etc.	Amiable relations, social & cultural values, etc...
4.	Veena Zankaar Vedic hymns & prayers of Goddess Saraswati	For each school & institute	Recitation of AUM, meditation, vedic hymns, & prayers	Universal values, love, compassion, grace, devotion, religious values, etc...

Primary schools of the district have used these audiocassettes during the last four years. The audiocassettes were made available to all the Block Resource Centers (BRCs) and Cluster Resource Centers (CRCs).

8.2 Methodology

The most remarkable feature of the audiocassettes produced by E.T. section of DIET, Rajkot was that they covered all aspects-production, singing, composing, selection of songs etc. that were taken up entirely by the teachers. The entire production process was very creative which involved the following stages:

- The training programme was organised by the E.T. branch of DIET, Rajkot in such a way that the audiocassettes were produced in the training classes only through workshop mode.
- Adequate care was taken by the E.T. section to ensure that adequate representation of teacher from all the divisions (talukas) of the Rajkot district was maintained before organizing the workshop for training and production of audiocassettes. About twenty teachers, all randomly selected, from the entire group of the teachers were invited to participate in the workshop.
- The trainees were asked to sing a song suitable as the content of the textbook of a specific grade i.e. standard on the very first day of training. The participants were asked to keep in mind standard of the textbooks (language, environment, and mathematics) and their subject matter for which the reference material was to be prepared. If the participants presented more songs for one subject, the selection of the songs was made through a unanimous decision of the entire group for cassette recording. The same procedure was used for developing the story-based cassettes. Thus, the teachers selected songs and stories, according to their suitability for various subjects, unanimously. All teachers had the freedom to express themselves, at this stage. At the time of selection, an expert musician was also present.
- The expert invited from a school, composed the selected songs and was the designated principal of a primary school.
- After completion of the composition of each song, the participants had a practice session of singing it well. Teachers practiced solo, duet and chorus songs during the sessions.
- After four days of sustained practice, all the songs were recorded in the studio in the voices of teachers on the final day.
- All participating teachers also decided the name/title of the audiocassette unanimously.
- The teachers themselves prepared a two-three minutes oral introduction to each cassette.
- Finally, the audiocassette was prepared through excellent teamwork.
- The titles of the songs were printed on the wrappers. This helps the user select the required song without any hassle.
- These audiocassettes developed and produced by primary teachers were quite cheap and cost around Rs. 18/- a piece.
- E.T. branch of DIET, Rajkot coordinated the work from production to distribution.

- Director, GCERT, Gandhinagar and other higher authorities released these audio cassettes during the function organized at the end of the workshop.
- The audio cassettes prepared by E.T., DIET, Rajkot reached to primary school classrooms through the co-ordinators of BRCs and CRCs in each district and were used by primary school teachers in the course of teaching. These cassettes were distributed to all the principals of DIETs in Gujarat state during a DIET principals' meeting.

8.3 Findings

During the experiment related to production and use of these audio cassettes, the following observations were made and these need to be shared:

- Students of primary schools had more enjoyment while singing and listening to these songs.
- Students, who learnt the song or story relevant to the lesson through audio cassettes, learnt these in a better and more effective manner and could remember these for a long time.
- Students took more interest in their studies when the teacher used audio visual aids in the classrooms. Students experienced joyful learning through this input.
- A cordial and close relationship was established between teachers and students whenever Bal Abhiyan Geets (action songs) or stories were presented in an interesting manner. The teacher and the students worked together and were involved in the activity and felt quite friendly.
- The students as well as the teachers did not feel any boredom during these classes.
- Listening together to a song or story together in a classroom is helpful in developing and refining listening skills of the students.
- Due to listening to and participation in these activities in the classrooms, students' understanding of rhymes, tunes and other features of singing was considerably improved.
- Children expressed their inner feelings freely during those activities. They acquired knowledge with understanding and had fun too e.g. "Vadla dale vandara toli karti hupa hup". (A group of monkeys is dancing on the branches of a banyan tree …) on listening the song, students were inspired to dance, jump and also perceive the feelings of love and togetherness towards animals.

It may be mentioned that when children listened to an audiocassette and performed an action song in a group, they got a stage to express their innermost feelings, which they could not have expressed otherwise. Thus, with the help of these audiocassettes, the music, the songs and the composition, children developed interest in music as well activities.

- Whenever the teacher asked the children to sing and act, a healthy atmosphere was created in the classroom and unique emotional vibrations were experienced by everyone.
- In case, a teacher is not good enough in singing or playing an instrument, she can overcome this limitation (with the help of an audio cassette).
- Educational values can be developed and propagated a lot more easily when the teachers and professionals prepare such audiocassettes. Therefore, such cassettes were seen to enrich educational atmosphere of the classroom and were used as a supporting material by the teacher.
- Bal geet and bal varta (stories) helped develop virtues and values among the students.
- Quality of the teaching could be improved to a considerable extent with these cassettes and that too within a shorter span of time.

- Teachers' time and energy of are saved, while the students have more fun and learn more through this approach. The teachers can use their energy more constructively for developing themselves professionally and improving their transaction techniques.
- As children remained busy with the activities, indiscipline did not arise.
- Though the audio cassettes prepared by the teacher were not of that excellent technical quality as those prepared by the professional artists, they offered more educational values and reflected more worthwhile learning experiences.
- When a teacher involved herself in teaching through audiocassette on regular basis, he develops the skills of singing or story telling. These skills can help her and her students later on as well. Audiocassettes prepared by teachers were a matter of pride. The teachers involved in the production of cassettes, felt satisfied and they considered it as an achievement that enhanced their self-esteem.
- It is necessary for the teacher to listen to the audio cassette completely before it was played in the classroom.
- An educational audio cassette is quite handy and much less expensive instrument; it can be used easily by anyone anywhere and at any time, it does not depend upon availability of electric supply for it's functioning.
- In rural areas where there are no computers and other higher technology gadgets around, educational activities can be carried out to a considerable extent with the help of audio cassettes alone provided the teachers know how to use these properly.
- Language skills like listening, speaking, comprehension, grammar-related can be easily developed in a systematic manner with the help of audio cassettes.
- Children are able to recall the contents learnt through the media of song and stories over a considerable period, thus supporting the inference that what is rhythmic and learnt by heart by the children can serve them throughout their lives.
- Pre-service trainees of DIETs were able to use these audiocassettes extensively in classrooms during teaching and also in school assembly and other cultural programmes.
- Worthwhile affective education can be imparted through use of songs and stories in primary schools because these educational audiocassettes can be used by teachers in the school as well as by parents at home.

8.4 Conclusion

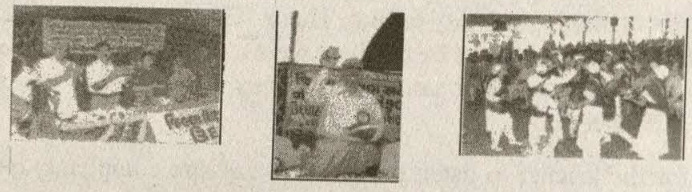
As a lecturer of an E.T. cell in DEIT, Rajkot, the author has learnt a lot through this experiment. She was able to observe changing attitudes of teachers, children and parents through this experiment in the classroom and in the homes. As the production of the audiocassettes progressed, she gained in her self-confidence. She was happy to see that ET cell of DIET, Rajkot took up the challenge of producing these audio cassettes, organized teachers workshops and mounted the classroom experimented so successfully

In conclusion, the author would like to state that: through this study

- Teaching and learning related various skills of teachers and the students were enhanced;
- Although many books on children action songs are available in the market and story telling, developing and cultivating children's skills was the main focus of this study. This is surely more worthwhile than asking children to read and sing these songs;
- Of the audio-visual media in classroom (a) helped educational processes to gain momentum. (b) helped increase the quality of education, and (c) ensured better overall growth of children.

The photographs given below capture some precious and memorable moments of this experiment.

Winners of Competitions



Cassette being released by Director, G.C.E.R.T, Gandhinagar in presence of Education Minister Smt. Anandiben Patel

Cassette being released by Director, G.C.E.R.T, Gandhinagar

Training workshop for teachers

Recording at studio

Story telling session in a school

CHAPTER 9

USING TECHNOLOGY FOR TECHER EMPOWERMENT: ORISSA EXPERIENCE IN COMPUTER-AIDED EDUCATION

Minakshi Mishra

Abstract

An attempt has been made in this paper to identify the process of teacher empowerment, its dimensions and activities. The role of Information Communication Technology in supporting the process of teacher empowerment has also been discussed by identifying computer as an ICT tool. The Computer Aided Education Programme (CAE) implemented in Orissa has been analysed. Detailed analysis of planning and designing of CAE, its operational structure and inputs provided under it have been discussed. A comparative analysis of the dimensions of teacher empowerment and implementation strategies of CAE for possible teacher empowerment has also been made. Further, an attempt has been made to explore the varied challenges faced by teachers with the implementation of CAE in Orissa. Lastly, the emerging scenario of post-implementation of CAE has been critically analysed to throw light on the immense potentialities of CAE and its future implications.

9.0 Introduction

The teacher is the key player in any pedagogical improvement programme. While the focus these days is on developing activity-based interactive pedagogy for primary school classrooms, the role of the teacher increases manifold and that is the reason for laying emphasis on teacher development programme on a continuous basis (SSA Guidelines Govt. of India, 2000). It is expected to transform teachers already in service into an empowered teaching force. This can be possible through developing confidence through personal knowledge acquired, the ability to make decisions and to take appropriate action based on necessary facts, These are considered to be the characteristics of an empowered teacher (Macroff, 1988; Mohanty, 2001; Urbanski, 1998). Empowering teachers is the ultimate objective of accelerating the process of empowering children as learners (Barksdale-Ladd, 1994; World Bank, 1977).

Classroom teaching-learning processes are these days undergoing a transformation from being teacher-centred and textbook-based to becoming learner-centred and experience-based. Since, the aim is to enhance learners' achievement to mastery level, no single approach or method is considered sufficient to cater to the learning needs of diverse categories of learners and to changing requirements of the learner with the progression of time. Multiple approaches essentially involve strategies employing appropriate communication technologies that are dictated by the vision of that technology and how it can help students learn. Equally important is how technology helps teachers to facilitate children's learning. Technology must make teacher's job easier, more productive and more self-satisfying (Hertzke, Olsen, 1994)

In Orissa, under Sarva Shiksha Abhiyan, Computer Aided Education (CAE) programme has been introduced in 600 upper primary schools on a pilot basis since 2004. Efforts are on to strengthen the capacity of teachers in helping students in operating computer and learning through it. Through this paper a conceptual analysis has been made of the process of possible teacher empowerment as a consequence of Computer Aided Education (CAE) programme in Orissa.

9.1 Teacher Empowerment

Enhancement of the quality of learners' performance is the primary goal of quality education. This will be actualized if the teaching learning process is effective and result-oriented. The role of teacher's efficiency in handling classroom transaction to meet the challenges of dealing with diverse students is key to produce desired results. Thus, the academic excellence of students can be achieved only through empowerment of teachers.

Developing confidence in personal knowledge and the ability to make decisions and take action based on the facts acquired are the hallmarks of an empowered teacher in developing these abilities systematically can help in professionalisation of teaching force (Macroff, 1988; Urbanski, 1988). The teacher is empowered when he/she engages oneself in the pursuit of (a) increasing one's level of personal knowledge and continuous desire to increase one's knowledge base; (b) taking action using the knowledge gained in an appropriate situation, and (c) taking appropriate decisions at appropriate time on the basis of knowledge gained. An empowered teacher develops self-confidence to take strong decisions that can affect students' learning and taking control of the teaching-learning process. Furthermore, an empowered teacher is capable of doing self-analysis and self-reflection. He/she continuously strives to use the teaching materials in a creative manner and uses one's personal talent to enrich the transactional process to bring about improvement in the learning level of students. The empowered teacher also recognizes the role of parents and community in shaping the learning pattern of students and interacts regularly with them to discuss educational problems and progress of their children. Thus, empowerment of a teacher occurs by

- upgrading one's personal knowledge and skills;
- building relationships with all stakeholders in education for increasing and improving educational experiences; and
- creating a favourable environment for effective teaching learning and better learner performance.

Process of Teacher Empowerment

Teacher empowerment has direct significance to the learning achievement of students at primary level. The major identified weaknesses of the teaching force in primary schools of India are: poor subject mastery, limited teaching skills, high absenteeism and lack of motivation (World Bank, 1996). Researchers have observed that there is affinity between teacher efficacy and (a) teacher's willingness to implement innovation; (b) teachers' stress level; and (c) teacher's willingness to stay in the field. (Tschannen-Moran, Hoy & Hoy, 1998). Student achievement will be enhanced by positive teacher attitudes but teachers generally lack subject mastery and confidence to teach and thus hinder the development of such attitudes (World Bank, 1999).

Developing mastery in content and skills of teaching, becoming regular and interested in the job and willingness to act, all these together, it can be argued, constitute the efforts for building self-confidence. Self-confidence can be further strengthened through sharing either with colleagues and academicians or with parents and community members or both. A self-confident teacher can only be able to take appropriate decisions, prepare action plan for innovative pedagogical practices to enhance the learning level of students (Fig.1)

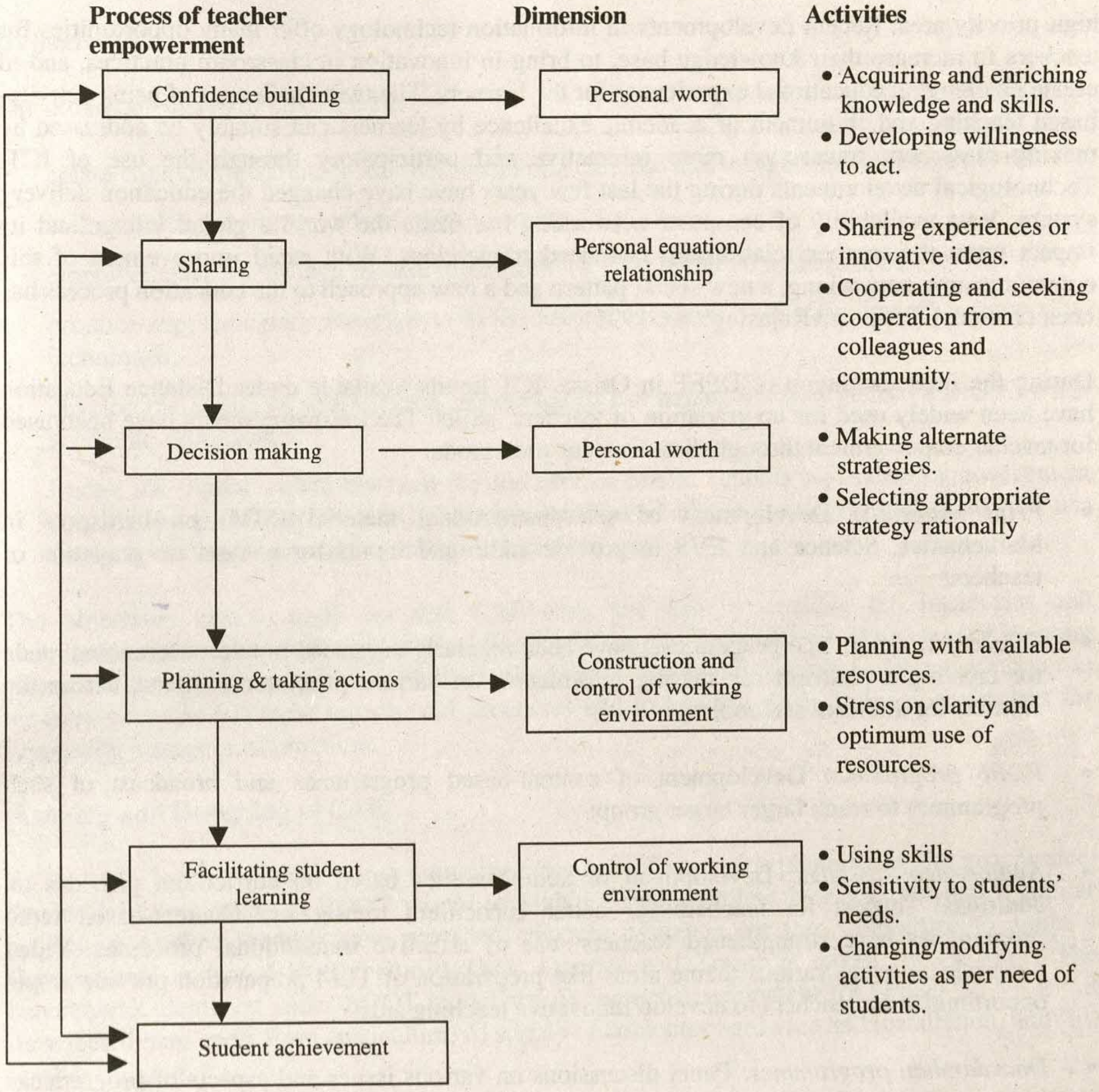

Process of teacher empowerment
Dimension
Activities
Confidence building
Personal worth
• Acquiring and enriching knowledge and skills.
• Developing willingness to act.
Sharing
Personal equation/ relationship
• Sharing experiences or innovative ideas.
• Cooperating and seeking cooperation from colleagues and community.
Decision making
Personal worth
• Making alternate strategies.
• Selecting appropriate strategy rationally
Planning & taking actions
Construction and control of working environment
• Planning with available resources.
• Stress on clarity and optimum use of resources.
Facilitating student learning
Control of working environment
• Using skills
• Sensitivity to students' needs.
• Changing/modifying activities as per need of students.
Student achievement

Fig.9.1: Process of Teacher Empowerment
(**Source:** Mohanty, 2001)

It can be argued from the above that the process of teacher empowerment ultimately leads to developing confidence in teachers to perform better. It also provides autonomy to a teacher to make decisions and implement them at school and in transactional processes. Acquiring such autonomy can be accelerated to a great extent though gaining competence in the use of information and communication technology.

With rapid improvement in the area of communication, a new social pattern has been created, and a new approach to learning in contrast to the traditional one can be seen. (Tiffin and Rajasingham, 1995) with ICT providing new avenues of access to resources and people at all times, it has tremendous potential to facilitate teachers' learning and professional development (Leach, 1997, Maier, 1998).

9.2 Information Communication Technology as a Tool for Teacher Empowerment

As discussed earlier, the teacher is the key actor in educational activities and is instrumental in bringing about improvement in educational system. The empowerment of a teacher is therefore, a high priority area. Recent developments in information technology offer many opportunities for teachers to increase their knowledge base, to bring in innovation in classroom practices, and to create challenging educational experiences for the learners. The twin challenges of using activity-based teaching and attainment of academic excellence by learners can suitably be addressed by making classroom transaction more interactive and participatory through the use of ICT. Technological developments during the last few years have have changed the education delivery system. Vast availability of computer networking has made the world a global village and its impact upon the teacher relationship is indeed tremendous. With rapid improvement of this communication networking, a new social pattern and a new approach to the education process has been created, (Tiffin and Rajasingham, 1995)

During the implementation of DPEP in Orissa, ICT inputs available under Distance Education have been widely used for up-gradation of teachers' skills. The following media have been used for teacher empowerment through distance education mode:

- *Print materials:* Development of self instructional material (SIM) on hardspots in Mathematics, Science and EVS to provide additional inputs for content up gradation of teachers;

- *Teleconferencing:* The programmes have been regularly organised in teleconferencing mode for creating a platform for sharing information on various programme inputs, across the districts for different stakeholders;

- *Radio programme:* Development of content-based programmes and broadcast of such programmes to reach larger target group;

- *Audio/video cassettes:* Development of audiocassettes based on curriculum provides an additional support for teachers for better curriculum transaction. Content-based radio programmes have strengthened teachers' use of effective transactional processes. Video materials covering various theme areas like preparation of TLM preparation provide ample opportunities for teachers to develop innovative teaching aids;

- *Doordarshan programmes:* Panel discussions on various issues and aspects of programmes inputs; and

- *Capacity building:* Capacity building of personnel in DIETs and field-level functionaries through their involvement in the development of different multimedia packages and other related distance-learning materials.

Hence, ICT is consequently redefining the educational process in Orissa. Technological developments are changing the delivery system of education in the state.

9.3 Computer-Aided Education

DPEP/SSA, Orissa has stressed continuously adoption of new interventions to bring about perceptible qualitative improvement in teaching-learning process. Therefore, computer-aided education (CAE), an innovative programme, has been conceptualised to meet the challenge of adopting new pedagogical practices. To make effective use of the opportunities available in modern technology, this innovative programme of using computer as a teaching aid has been introduced in elementary schools of Orissa under the innovative scheme of education component of SSA. Computer-aided-education (CAE) made a head start on 5th September 2004. The programme is named as Biju Pattnaik Computer Aided-Education Programme (BPCEP).

Objectives

The broad objectives of CAE are **to**:

- create computer awareness and literacy among children and teachers at elementary level;
- make teaching-learning joyful and interesting;
- empower teachers through the use of educational CDs prepared on hard spots;
- produce supplementary materials with the help of graphics, animation and other innovative techniques;
- develop the ability of self-learning, encourage its use among learners thereby increasing this academic skills; and.
- bridge the digital divide between the learners of public schools and those of government schools, by providing them suitable opportunities at elementary level and learn and use computer to supplement the teaching- learning process.

The objectives clearly spell out that CAE does not aim at teaching the intricacies and technicalities of computer. It aims at providing joyful, interactive and interesting ways of learning through illustrations, examples, graphics etc. Its focus is to provide knowledge about computer to teachers on basic technical aspects and processes and to educate them on using computers for supporting pedagogical practices.

Planning and Designing of CAE

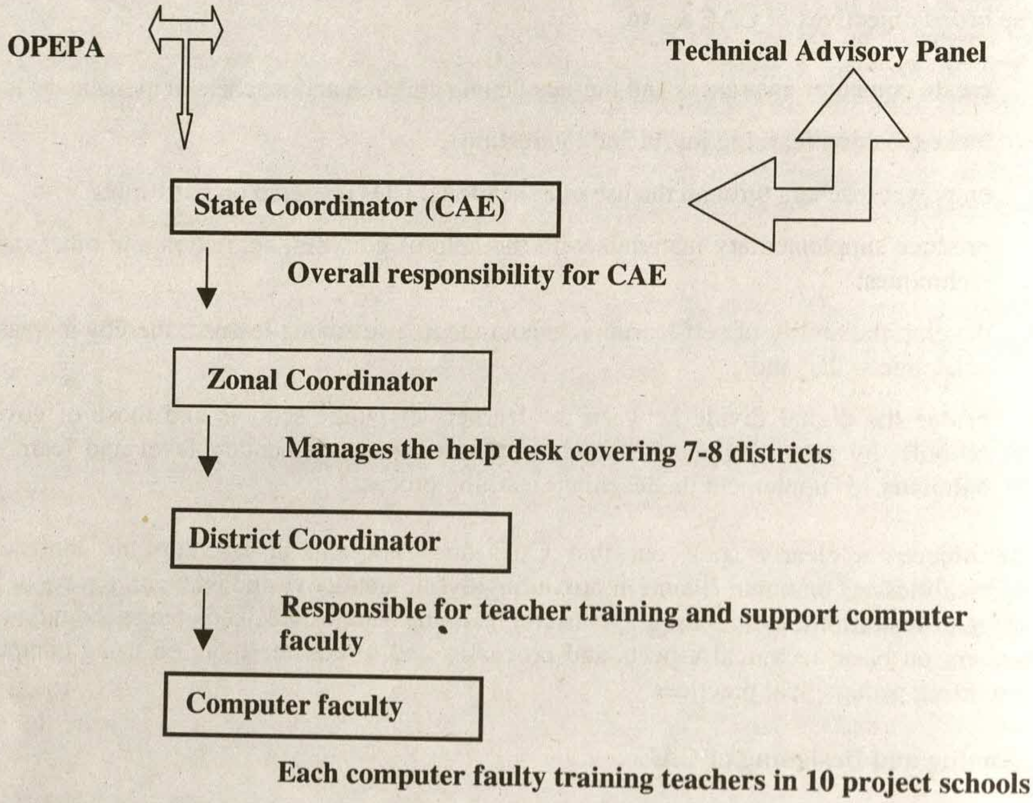
At the state level, a high-powered committee has been formed for planning of the programme. Successful experiences of BOOT model in Mahite Sindhu Project in Karnataka and a similar project in Andhra Pradesh have provided concrete evidence for this Committee to adopt a Government sponsored BOOT (Build, Own, Operate and Transfer) model for the state. The benchmarks identified under BOOT model are (i) content development for Grades V, VI & VII on selected hard spots from curriculum; ii) supply of computer hardware and installation; and (iii) teacher training.

It has been planned to implement the project in 900 schools in over 30 districts of the State in two phases. In the first phase, the programme has been launched in 600 schools in 24 districts. The schools must have RCC roof and electricity connection; these are the fixed criteria for selection of schools. The president of the school committee of schools selected for CAE has to undertake a guarantee for the following: (a) security of hardware, software and connected accessories of the computer lab;(b) zero-absenteeism and regular visit of the project staff employed for implementation of CAE; (c) quality of education; and (d) sustainability of the project. Each school covered under CAE has been supplied with three computers, one printer, three UPSs, one anti-virus software programmes per computer, one Office and Linux 2000, sheets of paper, 50 floppy disks, 4 ink ribbons per annum.

Implementation Mechanism of CAE

- Implementation of CAE has been carried out by APTECH Ltd., and EDUCOMP Ltd., (selected through national bidding) under the supervision of DPEP/SSA, Orissa.
- 300 schools from 12 districts have been covered by each company.
- Facilities provided by the SSA, Orissa include a pucca room, electrification of the room, furniture (15 chairs and 3 tables for each school).
- Facilities provided by the companies include hardware for each school, training of two teachers of each project school (i.e. under CAE), on the spot academic help, and facilitation.

The Operational Structure


OPEPA
Technical Advisory Panel
State Coordinator (CAE)
Overall responsibility for CAE
Zonal Coordinator
Manages the help desk covering 7-8 districts
District Coordinator
Responsible for teacher training and support computer faculty
Computer faculty
Each computer faulty training teachers in 10 project schools

Engagement of technical personnel at different levels is ensures that the operational mechanism is quite effective. One computer faculty engaged for 10 schools provides refresher training to the teachers at the school level. After an interval of 10 days, a faculty member visits these schools. The district manager coordinates the assignments of computer faculty and is responsible for the maintenance of computers. At the Zonal level "Help Desks" have been set up to provide spare parts and hardware at the field level. Smooth operation of the CAE so far can be attributed to the following factors:

- The firm responds immediately in case of any trouble related to the hardware; and
- Maximum down time allowed to the firm for replacement is seventy-two hours, failing which heavy penalties are levied

Content Development through CDs

Educational CDs have been prepared on curriculum areas of computer literacy, science, mathematics, and English; the teachers have identified hard spots. All content development has been done in local language i.e. Oriya. The whole process of CD development including follow-up activities i.e. topic identification, script development, preparation of sample CDs, field testing and final CD development has been completed. The CDs have been developed for classes V, VI and VII.

9.4 Challenges for Teachers

CAE in Orissa is bringing about changes in the teaching-learning process, which were not visualised earlier. Students' involvement in the learning process as a result of working on computers and their increasing awareness of their potential for self-learning have affected the perspective on teachers role as a facilitator of learning. Various challenges confronted by the teachers' area under:

- Adaptation to new technology: The teachers need to be well versed with how a computer operates as well as content component of CDs;
- Scheduling for facilitating computer-aided-education in the school;
- Identification of training and support needs; and
- Assessment of students' learning and collection of feedback.

Implementation strategies of CAE in Orissa have exactly addressed these concerns. CAE in Orissa has been designed not only to help children learn more and better but also to enable the teachers teach effectively. The vision is to make the teacher's job easier, more productive and more self-satisfying.

9.5 Teacher Empowerment through CAE

The following steps have strengthened the process of teacher empowerment through CAE:

Training Inputs

Training schedules have been drawn up to make teachers competent to work on computer and use computer-aided learning. Teacher training schedule for 12 days (8 days in the first phase and 4 days in the second phase) has been drawn up. Two teachers from each school covered under CAE have already been trained for 8 days in the first phase. During this first phase, teachers are trained to use the CDs developed in content areas and on basics of computer operation so that teachers would be able to use the computer for school level activities. The content areas of the training include

- *Word processing:* to help the teacher prepare mark sheets, question paper for unit test, time table etc.

- *Spread sheet:* to prepare long documents like student performance record, year-wise results, calculation of percentage result etc; and

- *Presentation:* to prepare presentation relating to school level activities like science exhibition, text, graphical presentation of data, audio and video etc. The teacher equips himself to present data graphically in order to facilitate long term planning for the school.

Confidence Building

Research on teacher development shows that school reforms cannot succeed unless they focuses on creating conditions in which teacher can teach and teach well (National Commission, 1996). With the introduction of CAE, the teachers no longer depend on a single source of information, typically a textbook, but get various opportunities to use a variety of information sources. Teachers are trained to handle the computer and prepare data sheets for upgrading their skills. Use of computer in itself helps boost the teacher's confidence. More opportunities now available for using the computer are making teachers more confident and increasing the possibilities for innovative ideas and practices.

Sharing

The ability to use 'word processing' helps teachers prepare students' mark-sheet and conduct unit tests etc. This facilitates greater use of such databases for planning and other activities. Being confident, teacher now feels quite comfortable in sharing their classroom practices with other teachers, academicians, expert groups, parents, etc. This facilitates sharing of school records with different stakeholders and makes it easy and productive. The relatively more important aspects of sharing involve the use of innovative ideas generated by teachers involved in novel learning activities while providing support to students. Such ideas generated in computer classes and block level meetings of teachers helped them acquire greater confidence in their ability to work innovatively.

Decision Making

With the use of computers as a means of self-learning the teacher has to make several decisions for facilitating learning situations in school, these include the following decisions:

- About appropriate time to use CDs in the classroom;
- Content selection; and
- When to intervene while student is working on CDs.

Planning and Taking Action

Being well versed in handling the 'spread sheet' the teacher becomes capable of preparing long documents on the computer. He records student performance, attendance record etc. to formulate plans for each student. Analysis of such records guides teachers to evolve suitable strategies for each student. As a result, planning becomes more focused and result-oriented. The teacher becomes capable of preparing action plans for facilitating CAE in other schools as well.

Facilitating Student Learning

With computer-aided education, children can learn concepts with the help of appropriate graphics, animation, story etc. CDs developed on hardspots in mathematics, EVS and language provide a resource support to teachers to teach the curriculum in more effective and child-friendly manner. Furthermore, CAE offers the teacher an opportunity to develop interactive materials for learners, which facilitate student learning, and further equip teachers to create innovative learning environments for their students. CAE empowers teachers to create opportunities for promoting group learning as well as self-learning. The students view their performance each day in a different light. They became concerned about reaching the desired performance levels, and their progress rapidly improves (Hertzke, Olsen, 1994).

Content CDs are developed on hardspots identified by teachers. The upgrade teacher's skills to effectively handle the teaching-learning process. The teacher is now better equipped to handle various teaching-learning situations. The students are now exposed to interactive mode of learning with colourful graphs and animations and show greater interest in learning activities to excel in their academic performance.

Implementation strategies of CAE in Orissa have successfully addressed these concerns. CAE has been designed not only to help children learn but also to help teachers teach effectively. The vision is to make the teachers' job easier, more productive and more self-satisfying.

Decision making follows a careful planning about students' learning situations, tapping available resources and taking appropriate action facilitating students' involvement in CAE and in learning outside the computer room.

All these processes are continuous and challenging and the teacher cannot help getting more and more involved in them thereby getting more and more empowered. Therefore, CAE is not viewed as an alternative learning strategy but as integral component of an ever-enriching learning process. Considered in a holistic scenario of learning, the real empowerment of teachers is on the threshold of new possibilities.

9.6 Conclusion

CAE has already evoked positive response from learners, teachers and parents. The increasing demand for its up scaling shall have immense significance for teachers. While they will be getting more and more involved in encouraging students to use computers for self-learning, they will also have to use it for up gradation of their personal knowledge.

Personal knowledge, in this context, shall have wider ramifications, which shall include up gradation of content knowledge, awareness of computer programmes and operations, developing scripts for hardspots in contextual areas to meet the learners' needs, probing into novel learning activities and using the internet. The immense potential of CAE can, thus, motivate teachers to update themselves, otherwise they may soon be condemned to Tofflerian 'obsolescence'.

With the increasing knowledge explosion, managerial skills of teachers would need to optimize the use of available learning time, pooling available resources and coordinating school and home time for CAE and other modes of instruction Teacher empowerment shall then be an option available to each teacher To become effective and to continue as effective teachers, they shall have to quickly and efficiently adopt and adapt themselves to new technologies. It is serious option and teachers need to take enlightened decision for themselves; and their decision is bound to affect their students' educational life.

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CHAPTER 10

POTENTIALS OF ICT FOR ELEMENTARY EDUCATION

N.K. Gupta

Abstract

The present paper attempts to highlight the great potential that Information and Communication Technology (ICT) possesses to meet the challenges faced by human race – of knowledge explosion on the one hand and social commitment on the other, especially at the elementary stage of education. Historic judgment of the Honorable Supreme Court of India in Unni Krishnan case leading to the 83rd Amendment in Indian Constitution and 93rd Amendment making elementary education as a fundamental right have thrown a bigger challenge to provide quality education to large masses. Ministerial Review Meeting of E-9 countries held in Beijing in August 2001 was a landmark in this direction. In India, the central and the state governments are responding well to this challenge by undertaking programmes like Adult Literacy Programme, Mahila Samakhya, Operation Blackboard, National Programme of Nutritional Support to Primary Education etc. DPEP and Sarva Shiksha Abhiyan are the national programmes to achieve the goal of universalization of elementary education.

However, the problems of unenrolled, dropouts, stagnated children compounded by low levels of achievement, poor school infrastructure, teacher vacancies and absenteeism can not be tackled efficiently without the support of technology. The fast growing ICT can become a useful tool in the hands of educationists to meet the challenge of spreading information, training and retraining of teachers, improving quality education, sharpening awareness of art and culture, inculcating abiding values besides providing formal education, guidance and counselling. Issues raised in this paper include the potential of ICT for elementary education, its scope, basic assumptions, use in school education, management strategies, its advantages and the services, which it can render. The author concludes with a plan for large scale use of ICT in education sector at elementary level.

10.0 Introduction

Elementary Education is well-established input essential for sustainable development of a country. If we need to compete to this race for development in the world, we will have to begin with elementary education. Strengthening of elementary education in terms of access, equality and quality is essential for our sustainable development. In this competitive global race, the survival of societies has itself become a stake where creation, use and storage of knowledge with transparency requires education, and acquisition of new knowledge and skills-since 1990, there has been continuous expansion of the use of media in school education in India especially for teacher training through teleconferencing/video conferencing, internet, e-mail etc. to make learning more interactive as well as lively. Major transformations in the development of human societies have always been a result of the changes that took place in the field of communication. If we trace back history, the invention of printing in 15th century triggered off a series of social, political and economic transformations. Telephone, radio, television and computers have added to fast growing dramatically improved information and communication technologies access. Advances in computers, telecommunications, media and their inter-convergence have opened new avenues and scientific revolution for the homo sapieans.

ICT for Sustainable Development

Communication and information technologies have been recognized to have enormous potential especially for developing countries and in furthering their sustainable development (Mansell and

When, 1998). Keeping in view the multi-dimensional nature and a large variety of our target learners, we need a dynamic system and modes of delivery. With a variety of needs to cater for and fast explosion of knowledge, fast media is the need of the hour (Gupta, 2004)[1]. The major target groups have been the teachers, the teacher educators, NGOs, parents, community members and children (Gupta, NK, 2004)[2]. Govt. of India has well recognized this potential and it has accorded it the highest priority. Atal Bihari Vajpayee, the then Prime Minister of India, in his speech to the people of Indian origin at a global organization function on January 3, 2001 remarked, "*We aspire to make India a knowledge super power by the year 2010. To make India a super power we need to address two major issues: (i) professional development of elementary education personnel (both teachers and teacher educators); and (ii information and communication technology need to penetrate into their functioning in various ways.*"

Use of ICT in School Education

ICT has tremendous potential as a tool for school improvement (Gupta NK, 2003)[3]. Use of ICT has resulted in substantial add-on capacity to generate, store, retrieve and distribute knowledge. Convergence, miniaturization and increased mobility have cut costs as never before. Multimedia and media combination within the same package resulted in its value addition.

Some educational benefits of ICT (Khan, 2001) are:

- Time, space and socio-economic factors are no longer a barrier to learning;
- Decentralized nature of new technologies frees learners from technology provider;
- Learners have access to a variety of learning resources;
- Latest and up to date authentic and reliable information can be accessed from any part of the world;
- Interactivity of media makes the process active; and
- Knowledge can be accessed in a variety of formats. (flexibility)

The whole world is witnessing a paradigm shift with regard to how information and knowledge is packaged, transmitted, distributed, accessed and processed (Jegede, 2000). The world is finding difficulty in keeping pace with the explosion of knowledge. To meet this challenge many innovative pedagogical practices in Europe and North America make use of ICT (Palgrum & Anderson, 1999). Use of ICT has facilitated school education in many ways (Kozma, et.al, 1999) e.g. students of lower secondary stage in Norway communicate with women and research stations in the area to learn about Antarctic continent; five rural primary schools worked simultaneously on same roots projects; teachers and students of Singapore have used "learning village" tools to implement standards-based approach for students' project work; US-based upper primary school has used interdisciplinary content from social science, math, science, economics etc. to create a range of projects to solve problems. Use of ICT opens up avenues for sharing up-to-date material at one's doorstep. The student and faculty need not be within the four walls of an institution for learning.

People living geographically apart can share knowledge, skills and resources (Gupta, NK, 2004)[3]. No doubt, it is in this area that real and significant "add-on-value" is available for learners, and teacher's educational experience. ICT has created more diversified and socially rich interacting contexts through shared use of computers for peer tutoring/interaction/correspondence via internet, networks, e-mails. One finds that a broad range of available ICTs has been put to a variety of educational use. Narrow telecasting /broadcasting has been in use for teaching in India for almost fifty years in the form of radio/television. Now satellite telecasting is being used in education in variety of forms for interactive school TV lessons, Internet access and computer-aided instruction are other forms of interactive teaching learning though these are not yet fully available to main stream Indian education system (Gupta, NK, 2004) [4]. What we need in such a situation is to develop skills to promote innovative use of ICT and address the problems of elementary education through teamwork. This involves diversification of competencies, interactions and collaborative efforts. These ICT-oriented applications are certainly likely to change the scenario of tomorrow. Some ICT strategies to promote access for school children are listed in Tables 1 and 2.

Table 1: Different ICT strategies for school children

Sl. No.	ICT Strategies	Technology Use
1.	Interactive radio instruction	National and regional radio broadcasting (terrestrial and satellite) + radios receivers (mains, batteries, solar powered or wind-up) + print materials.
2.	Schools broadcasting radio Child and teacher-initiated community radio broadcasts Television	• National and community radio broadcasting (terrestrial and satellite) + radios including solar & wind-up) + print materials. • Community radio broadcasts on subjects and information requested by children or teachers, e.g. producers download information from internet to broadcast or create print information for learners in their language. • National and regional TV broadcasting (terrestrial and satellite) + TV receivers + print materials.
3.	Children's programming on national and international radio and television stations	• Radio and TV cartoons about children's rights and conflict-resolution. • TV series promoting literacy. • TV campaigning + school curricula (part of a wider multifaceted strategy).

Source: Perraton, et al, 2000

10.1 Scope of ICT Use in Education

ICT has advantages over other modes of teaching-learning viz. accessibility of scarce resources/facilities/faculty/specialists by masses in best possible manner. There is a possibility of repeated use of training courses/ packages with easy updating and dissemination. There is now possible to maintain uniformity of inputs and have greater coverage. The process of active/interactive learning can facilitate on-the-spot decisions or clarity of concepts. It has features of quick delivery, appraisal, evaluation as well as feedback. It has facility of non-withdrawal of participants from their workplaces, which is more suitable in Indian school environment. It can provide presentations by experts, video clipping insertions, group discussions, question-answer sessions, interactions, use of multimedia resources, use of video, photographs etc. according to our needs and situation. It may have one to one, one to many or many to many interaction for a cooperative learning. Large scale demonstration, animation and illustrations about complex machines and their structures can be taught in simplified manner. It has no transmission loss in training, quality and geographic coverage of projects. Besides, it results in retention over longer periods of time, saves time, money and energy if used for larger masses (multiplier effect) etc.

Scope of ICT at Elementary Level

The scope for the use of ICT at elementary level is indeed unlimited, in the context of SSA, ICT can be used for

- Training and appraisal
- Need assessment

- Empowerment of state functionaries
    - Facilitators
    - Resource persons
    - SCERT personnel
    - State Board personnel
    - SIEMET personnel
    - DIET personnel
    - Teachers

    (Besides, it can be used for regional, state, block and cluster levels)

- Feedback and appraisal on issues of concern
- Curriculum renewals
- Identification of hardspots
- Collection of data from states/districts
- Dissemination of information about schemes
- Invitations for seminars/paper presentations
- Academic discussions
- Sharing innovations/researcher
- Guidance and counselling of parents, teachers, teacher educators and students. (Gupta, NK, 2003)[5].

Various interventions and innovations in different types of training programmes, awareness drives, capacity building workshops, meets and seminars have been tried which have been generated from feedback received from field functionaries. This has resulted in molding/formulations activities with their active involvement (Gupta, 2003)[6]. Different delivery media have their specific strengths and limitations. Difficult hilly terrain with restricted mobility leads to lack of or very poor access to information for teachers as well as the inhabitants (Gupta, 2003)[7]. Broadcasting has been used to provide direct teaching, interactions to provide enrichment programmes and interactive radio instruction. ICT can also be used in various ways to meet the needs of deprived and marginalized children, those in remote areas as well as street children, refugees and war victims. It may very well be utilized for the physically challenged also like the visually handicapped. Migrant children could also be benefited with the use of ICT. ICT has been found to be effective in raising teachers' capabilities in the classroom (Perraton & Creed, 2000).

Assumptions

ICT is not a substitute for face-to-face or classroom teaching; it is only an adjunct or a supplement to it and it can support classroom teaching. It can partly meet the need of those who cannot get an opportunity for classroom learning. In such a situation it becomes imperative that ICT may be used in teaching-learning process because it:

- strengthens current practices;
- is compatible with our needs and expectations;
- is easy to use;
- can be easily tried out without a huge commitment to change; and
- can be observed and modelled by the stakeholders.

Sustainable Use of ICT in Education

If the use of ICT in education is to be made sustainable, it needs to generate a sense of ownership among all the stakeholders. This can be done by integrating ICT with regular classroom teaching. Gyan Darshan, Gyan Vani, TDCC (ISRO), and in many TV channels (e.g. Discovery, Zee TV, Star TV, Doordarshan etc.) AIR, Direct to Home (DTH) internet, audio conferencing, video conferencing, teleconferencing, computer conferencing, main national networks INSET, EduSat, Audio-Video cassette player, SITE etc. could make it sustainable.

Parents' expectations from their wards are increasing day by day due to competition. To meet this challenge and to develop and enhance their intellectual and professional competency, the teachers need to have an orientation as well as access to ICT resources. With the use of interactive electronic technologies, it is now being realized that the quality of education, whether on-campus or off-campus, can be greatly enhanced if properly used. Helpline opened by CBSE and availability of training, administrative or management-related (eg. project management, curriculum development, course development), services (eg. guidance, advisory, information), research and social entertainment (interchange, sport coordination) etc. are some ready examples of sustainable use of ICT. Teachers can get oriented to ICT through ICT. They can be trained how to use technology in their teaching-learning process. ICT has made available technical solutions to people who know other languages. Web-users do not simply choose to remain in their own language circle through choice. There is evidence that there is greater scope for use of ICT in regional and minority languages than in the main/national language.

On-site Implementation and Management

ICT may be used to assist in decision making and develop problem solving abilities in order to utilize, diffuse, maintain and benefit from it. The use of ICT in and for education is rapidly expanding in many countries, and is now seen worldwide as a necessity and an opportunity. The Dakar Framework for Action (2000) identifies the use of new ICTs as one of the main strategies for achieving Education for All (EFA) goals. UNESCO is currently working on the use of ICT to strike a balance between equity and excellence in education. UNESCO's International Institute for Educational Planning (IIEP) is working on development of an e-learning course on FOSS (Free and Open Source Software) and creating a training programme; on mobile e-learning; 'school net tool kit', integrating ICT into school curricula etc.

Table 2: Ways to provide children with access to ICT

Sl. No.	Strategies	Technology
1.	Computer provision direct to existing schools, Government schemes, international collaborative schemes, tax-relief schemes, recycling scheme	PCs, Macs, Laptops, hand-held computers
2.	Building customized new schools computer-suites/labs/school annexes	state-of-the-art computer technology
3.	Mobile units	Internet, CD-ROMs, books, videos with satellite and videoconferencing equipment
4.	Community resource centres or kiosks providing access to (and sometimes training for technology outside school)	• Two old computers in each remote village school • Library with computers, access to internet, educational CD-ROMs, books, video, audio-cassettes, self-access packages • Free internet kiosk in cities. • High-tech access centre-computers, DTP, telephone, fax, e-mail, worldwide web (www), video, audio reprographics + library services/resources.

5.	Mediated ICT use	- Pupils without access to ICT make requests to mediators to download information from the Internet on their behalf (and send or broadcast back) + free radio-station cyber cafe. - Adopt-a-school projects – creating webpage on school's behalf to elicit funds or resources.

Source: Perraton et al., 2000

10.2 Feasibility of ICT Use in Indian Context

The foregoing discussion make a strong case for inclusion and integration of the use of ICT in a judicious and fruitful manner for school children as it has a great potential for beneficial contribution to children's life and learning. We need to promote the development of ICT materials and equipment that can be used at elementary level. Suitable pedagogical perspectives need to be developed and responded to assist pupils, teachers, administrators and other educators in school community. We need to develop an understanding of learning environments appropriate to promote the use of ICT and support critical use of ICT in elementary settings. Disabled, hospitalized, socially disadvantaged people and those living in far flung remote areas or hilly regions may also be brought within the reach of education through ICT for school integration (Gupta, NK, 2003)[1]. But all this will require dealing with ethical perspectives raised by application of ICT in education and its consequences and implications for teacher education and society. Analysis of problems likely to arise due to ICT in elementary education, large scale studies and evaluation of the issues arising from it and from pre-service and in-service teacher education will have to be addressed first. However, ICT can promote learning across all curriculum areas, respond to national concerns of equity and gender bias if used judiciously and if its impact is monitored from time to time. India has unique advantages due to its highly trained work force of IT professionals, extensive language use, democratic, political set up and stability, economic reforms, growing IT infrastructure, indigenous information and communication technology base, access to advanced level technologies through Indian IT professionals working abroad, well developed IT industry and well articulated IT and telecom enabling policies and cyber laws (Khan AW, 2001). Even US National Intelligence Council in its report on global trends (2015), has acknowledged India's capacity and capability as a front runner in developing IT (US National Intelligence Council, 2001). G-8 nations (2002) have identified the need to prepare students for life-long learning and highlighted the central role that ICT can play in accomplishing this goal. ICT is increasingly being used to produce knowledge products, to conduct investigations and inquiries and to connect with other people and cultures (Kozma RB, 2003).

10.3 Widening the base of e-Learning in India

Tele-learning Resource Centres (TRCs) need to be established at each block level to harness the potentials of technology for professional development of elementary education personnel and to enhance access to learning opportunities. Designing flexible and sustainable models of education with alternative models can be helpful in providing ICT services relevant to the needs of the community. ICT needs to play a central role in this alignment and it needs to be integrated throughout the educational system. It needs to develop new curricula based on real world problems, provide tools to enhance learning, create opportunities for teachers and students for feedback and reflection and help to build integrated local and global communities of students, teachers, scientists, resource persons.

The role of call centres and help lines in providing guidance and counselling services and reducing stress among parents and students particularly at the time of examinations cannot be underestimated. Both curricular and co-curricular support in the form of strategy is possible through the use of ICT. Major role of ICT has till now been limited curricular subjects or informatics, it is now gaining importance as an instructional aid (like computer-assisted instruction) to support changes in curriculum, teacher training, pedagogy and assessment. This new relationship between knowledge and society has emerged from the dramatic changes that application of ICT has unleashed.

10.4 Conclusion

The author would like to conclude with the following excerpt:

> *"Education must change to enable us to cope up with the changes in society. The ability to organize, analyze information, learn interactively and creatively at one's own pace, drawing a number of ideas together through common themes requires use of ICT in elementary education".*
>
> *"ICT can provide opportunities to engage and motivate children and meet their individual learning needs. It can make significant contribution to teaching and learning across all subjects and ages, inside and outside school; help link school and home by providing access to teaching and learning and to assessment and attendance data from home. It enables schools to share information and good practices, intelligent information management systems, integration between curriculum and management, monitor individual progress, use shared plans and other resources etc." (Deptt. of Education, UK, 2000)*

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CHAPTER 11

DESIGNING AN ICT-ENABLED TEACHER EDUCATION PROGRAMME: THE RATIONALE AND FRAMEWORK

Nityananda Pradhan

Abstract

Educational systems around the world are under increasing pressure to use new information and communication technologies (ICTs) to teach students knowledge and skills they would need in the 21st century. With emerging new technologies, the teaching profession is evolving from an emphasis on teacher-centred, lecture-based instruction to student-centred, interactive learning environments. Designing and implementing successful ICT-enabled teacher education programmes is the key to fundamental, wide-ranging educational reforms. To reap the full benefits of ICTs, it is essential that during professional training, teachers be enabled to effectively use these new tools for learning. Teacher education institutions also need to develop strategies and plans to enhance the teaching-learning process within teacher education programmes and to assure that all future teachers are well prepared to use the new ICT-based tools for learning. This paper attempts to develop a framework for ICTs in teacher education. It addresses four themes and four competencies as proposed in the UNESCO (2000) framework for ICTs in Teacher Education.

11.0 Introduction

Information and communication technologies (ICTs) are a major factor in shaping the new global economy and producing rapid changes in society. During the past decade, new ICT tools have dramatically changed the ways in which people communicate and do business. They have produced significant transformations in industry, agriculture, medicine, business, engineering and other fields. They also have the potential to transform the nature of education: where and how learning takes place and the roles of students and teachers in teaching-learning process. To reap full benefits of available ICTs, it is essential that teachers have basic ICT skills and competencies. Teacher education institutions must provide leadership and evolve new pedagogies and tools for learning. They should also provide leadership for designing how new technologies can be best used. To accomplish these goals, teacher education institutions must work closely with teachers and administrators at the state or national levels, educational agencies, teacher unions, corporate houses and community organizations, politicians and other important stakeholders. The following essential conditions must be met in order to effectively harness the potential of new information and communication technologies to improve teaching as well as learning:

- Students and teachers must have sufficient access to digital technologies including internet in their classrooms, schools and institutions;
- High quality, meaningful, and culturally responsive digital content must be made available to teachers and learners; and
- Teachers must have knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards.

(UNESCO, 2002 a, p.10)

Teacher education institutions are faced with the challenge of preparing a new generation of teachers that can effectively use these new learning tools in their teaching practices. For integrating these concerns, teacher education programmes, teacher education system requires new ICT resources, expertise and careful planning about how these resources should be used.

11.1 What are ICTs?

ICTs can be briefly described as the result of convergence of technologies–telecommunications and television with informatics. The computer considered as an engine of the mind has tremendous capacity to store and process data and to produce and disseminate information. With the emergence of diverse multimedia and networking possibilities, computers have emerged as tools for innovative teaching and learning. For the first time in the history of education, students are proving more adept than their teachers at mastering ICT- based delivery systems. It is obvious that the monopoly enjoyed by schools and formal education providers will diminish dramatically hereafter with future educational exposure and experience in readily available outside these institutions. The scope of the new technologies for transforming existing educational set-up is indeed enormous and includes the possibility globalization of education, adaptation of foreign curricula, new teaching materials and the networking of schools.

11.2 Changing Views about Learning Process: From Teaching to Learning

In contrast to the traditional teaching-learning paradigm, the emerging new paradigm is based on three decades of research in human learning. The traditional view of the learning process is typically teacher-centred, with teacher doing most of talking and intellectual work, while students remain passive receivers of the information being provide to them. This however does not imply that lecture as a technique is without value. Lecture allows the teacher to quickly convey lot of information to students and is useful for quick recall. However, it is not considered the most effective way to help students develop and use higher order cognitive skills and to solve complex real world problems. As noted by Driscoll (1994), we no longer can view learners as *"empty vessels waiting to be filled, but rather as active organisms seeking meaning."* Technology has created change in all aspects of society, it is also changing our expectations about what students must learn in order to function effectively in the new world economy. Students will need to learn to navigate through large amounts of information, to analyze and make decisions, and to master new knowledge domains in knowledge-based society. They will need to be lifelong learners, collaborating with others in accomplishing complex tasks, and effectively using different systems for representing and communicating knowledge to others. A shift from teacher-centred instruction to learner-centred instruction is needed to enable students to acquire the new 21st century knowledge and skills. The following table (Sandholtz, Ringstaff, and Dwyer, 1997) identifies the shift that will take place in changing from a focus on teaching to a focus on learning:

Table 1: Teacher-centred and learner-centred learning environments

	Teacher-centred learning environments	Learner-centred learning environments
Classroom activity	Teacher-centred, didactic	Learner-centred, Interactive
Teacher role	Fact teller, always expert	Collaborator, sometimes learner
Instructional emphasis	Memorization of facts.	Relationships, inquiry and invention
Concepts of knowledge	Accumulation of facts, quantitative.	Transformation of facts
Demonstration of success	Norm referenced	Quality of understanding
Assessment	Multiple choice item	Criterion referenced, portfolios and performances
Technology use	Drill and practice	Communication, access, collaboration, expression

11.3 Changing Role of the Teacher

The traditional relationship between the teacher and the pupil is frontal – the role of the teacher is to deliver knowledge to the pupil. There is some co-operation among pupils. This is fast changing. Most teachers do not possesses adequate knowledge and skills for the effective exploitation of ICTs. In many cases, they are less proficient than their pupils. Furthermore, there is likely to be confusion in the teacher's mind about his/her new role in relation to the use of these technologies, i.e. teachers find themselves in a situation where they are no longer the principal source and deliverer of information. If teachers find themselves less capable of making effective use of ICTs in the classroom, they need first to be properly trained in pedagogical skills using ICT resources and acquire adequate knowledge for developing pupils' learning skills using these resources.

The traditional and the new relationships between teacher and pupils can be seen in Figs. 11.1 and 11.2 (UNESCO, 2000, p.30):

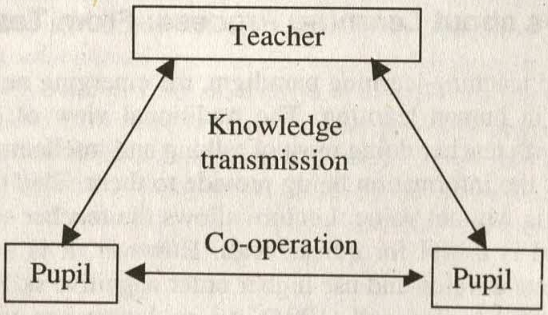

Fig.11.1: The traditional teacher- pupil relationship

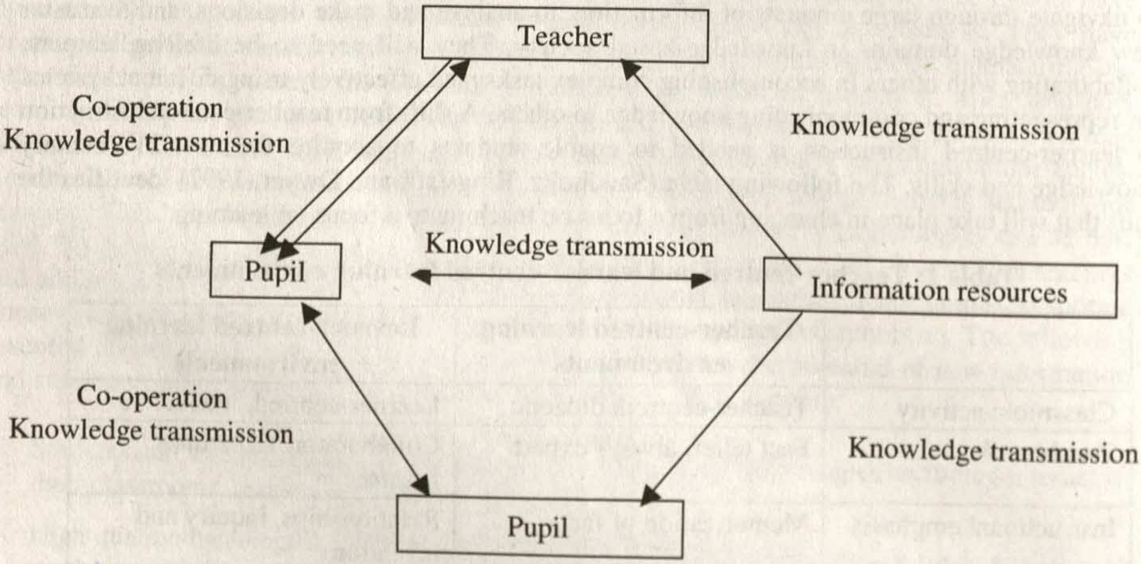

Fig.11.2: The new teacher-pupil relationship

Newby et al (2000) describes how the role of the teacher will change from knowledge transmitter to that of learning facilitator, knowledge guide, knowledge navigator and co-learner with the student. This new role, however, does not diminish the importance of the teacher but requires new knowledge and skills from him. This process of shift is shown in table 2.

Table 2: Changes in student and teacher roles

Changes in teacher role	
A shift from	A shift to
Knowledge transmitter, primary source of information, content expert, and source of all answers	Learning facilitator, collaborator, coach, mentor, knowledge navigator, and co-learner
Teacher controls and directs all aspects of learning	Teacher gives students more options and responsibilities for their own learning
Changes in student role	
A shift from	A shift to
Passive recipient of information	Active participant in the learning process
Reproducing knowledge	Producing and sharing knowledge, participating at times as expert
Learning as a solitary activity	Learning collaboratively with others

Source: Newby et al., 2000

11.4 ICTs and Teacher Education

There are a variety of approaches to professional development of teachers in the context of use of ICTs in education. Professional development to incorporate ICTs into teaching and learning is an ongoing process. Teachers need to update their knowledge and skills as school curricula and technologies change. Two dimensions of teacher training are fundamental: teacher education in ICTs and teacher education through ICTs.

Teacher Education in ICT

The most obvious technique for professional development of teachers is to provide courses in basic ICTs knowledge and skills. It is necessary for teachers to become skilled in operating the new technologies and in exploiting them effectively as educational tools. Teachers must master the use of information – skills of research, critical analysis, linking diverse types and sources of information, reformulating retrieved data – if they are to teach their pupils to develop these skills. Emphasis should be placed on training in pedagogy, as opposed to the current trend in many education systems where the major focus is on specialized knowledge in specific curricular subjects. Teachers must be adequately equipped with more didactic competencies so as to assume their new role as experts in the learning process.

Teacher Education through ICTs

ICTs can support effective professional development of teachers. Using ICTs as tools for training of teachers is as important as introducing the basics of ICTs to prospective teachers. ICTs sources of information and expertise, as well as tools for distance communication offer many new possibilities for teacher education. Teachers may learn new forms of communication through regular use of these technologies. Use of new media, new rules of communication – even a new language would have to be learnt.

11.5 A Framework for ICTs in Teacher Education

While planning for infusion of ICTs into teacher preparation programmes, factors important for the success of a programme must be considered. A holistic framework proposed by the UNESCO (2002) takes into account these factors, e.g. cultural, educational, technology resources, which are important in planning the integration of technology into pre-service curriculum (p.39). The framework provided in Fig. 11.3 has been designed to assist policy makers, teacher educators, textbook writers, and other professionals who are charged with developing the use of ICTs in teacher education.

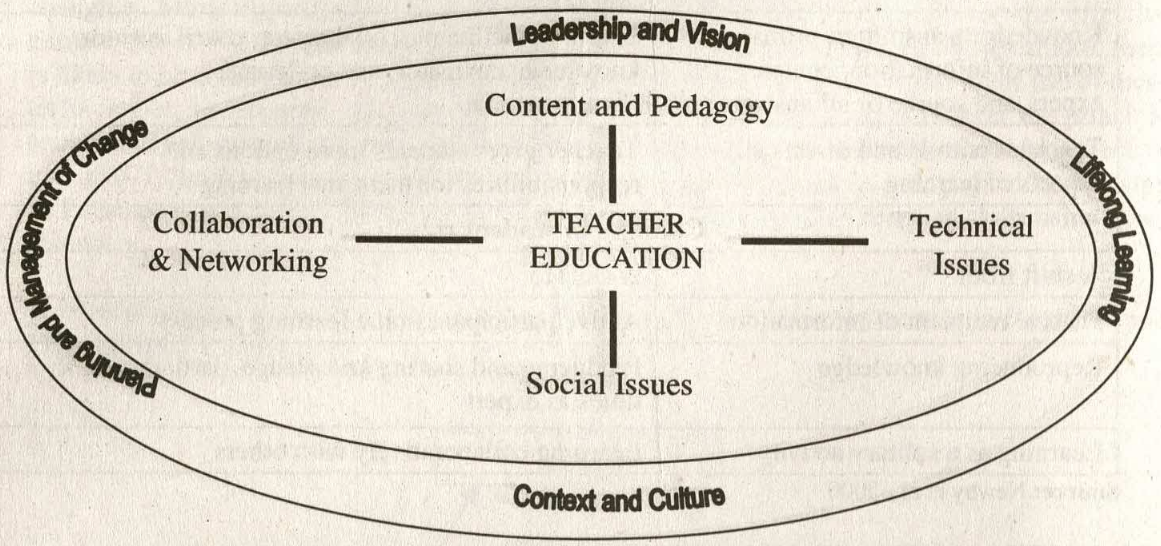

Fig.11.3: A Framework for ICTs in Teacher Education
Source: UNESCO, 2002-a, p.41

Fig. 11.3 shows that the curriculum framework comprises of four clusters of competencies encircled by four supportive themes. The curriculum framework also suggests that each teacher is allowed to interpret the framework within his or her context and personal approach to pedagogy, which is always related to the subject discipline or content area, rather than to the technology itself. This model illustrates the interdependence of the themes and competencies, all themes interacting with all competencies.

Four Themes

Context and culture identifies cultural and other contextual factors that must be considered in infusing technology into teacher education curriculum. It includes the use of technology in culturally appropriate ways and development of respect for multiple cultures and contexts, which need to be taught and modelled by teachers. Leadership and vision are essential for successful planning and integration of technology into teacher education. This requires both support from the management of teacher education institutions. Lifelong learning acknowledges that learning does not stop after school. Planning and management of change is the final theme, born of today's context and accelerated by technology itself. It signifies the importance of careful planning and effective management of the change process. These themes may be understood as a strategic combination of approaches that help teacher educators develop four core competencies. These core competencies may be seen as clusters of objectives that are critical for successful use of ICTs as tools for learning.

Four Competencies

ICT competencies are organized into four groups. Pedagogy is focused on teacher's instructional practices and knowledge of the curriculum and requires that they develop applications within their disciplines that make effective use of ICTs to support and extend teaching and learning. Collaboration and networking acknowledges communicative potential of ICTs to extend learning beyond the classroom walls and its implications for teachers' development of new knowledge and skills. Technology brings with it new rights and responsibilities, including equitable access to technology resources, care for individuals' health, and respect for intellectual property included within the social issues aspect of ICT competence. Finally, technical issues are an aspect of lifelong learning through which teachers update skills with hardware and software as new generations of technology emerge.

11.6 Conclusion

Information communication technologies offer vast opportunities for the development of contacts and exchanges with the rest of the world. Incorporating these technologies successfully into schools requires careful advanced planning and preparation. Adequate financial and human resources are required with training as an essential component of the process. Robust systems must be put in place. Innovators need to be prepared to confront bureaucracy and conservative attitudes, including resistance by teachers and other supporting staff. The following points must be kept in mind while designing content as well as process of education:

- ICT will have a deep impact on the way formal education is organized and conducted.
- The rate at which we need to respond to changes affecting education will be much faster than ever before.
- It is urgent to realign curriculum framework to provide outcome-based, flexible learning paths leading to mastery learning for learners.
- Training and orientation of teachers, administrators and students to new learning technologies is an immediate requirement.

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CHAPTER 12

CAPACITY BUILDING AND TRAINING IN ICT-ENABLED E-LEARNING SOLUTIONS

R. Ayyappan

Abstract

The phenomenal growth of Information and Communication Technology (ICT) and its significant use in the field of education has led to the possible realization of 'Education for All' and 'Lifelong Learning'. The indigenous development and launch of EduSat will provide a significant boost to countrywide distance education in India. Broadband internet is a boon for internet based e-learning solutions. Anna University is a pioneer in e-learning, with its EduSat programmes covering all the 29 DIETs in Tamil Nadu. The benefits of e-learning and training are many. Cost saving, anywhere, any time, flexibility, specific learning, global interaction and sharing of ideas are some of the benefits of e-learning solutions. Teachers should be trained in basic ICT skills so as to reap the benefits of e-learning. Also suitable skills for teachers are to be identified and they should be trained in content creation for developing e-learning materials.

This paper presents a plan of action for training all the 1.8 lakh primary and elementary teachers of Tamil Nadu in basic ICT skills and lists the ways and means of content development for e-learning so as to build their e-learning capacities.

12.0 Introduction

The phenomenal growth of ICT and their significant use in the field of education has led to the possible realization of 'Education for All' and 'Lifelong Learning'. ICT has made it possible to impart uniform and high quality education to all enjoying different geographical, religious and socio economic status. By using ICT, the educators can gain access to a wide range of media – print, radio, television, audio-video, teleconferencing and tools like computers, CD ROMs, internet, e-mail, e-libraries, e-books and e-learning and training.

Electronic media is time-tested and has a definite role to play in the field of distance education. In fact, the latest innovations in the area of teachers' training through distance education have been possible through electronic media. Educational television is more than 35 years old in India. Educational radio is older than educational TV. Student response is in favour of television and interaction with image and voice - preferably two- way video, otherwise one-way video and two-way-audio. Interactivity will be the main feature of programme delivery. Satellite-based interactive teleconference learning and computer-assisted interactive learning are the main methods that evolved essentially from electronic media. In this paper some benefits and solutions of e-learning and processes involved in developing e-learning training lessons for primary/ elementary teachers have been discussed.

12.1 Background

The Geo-synchronous Satellite Launch Vehicle (GSLV-F-01), carrying EduSat, India's exclusive satellite for educational services, was launched from the Satish Dhawan Space Centre, Sriharikota, at 4.01 p.m. on September 20,2004. Built for a mission life of seven years, EduSat is mainly intended to meet the demand for an interactive satellite-based distance education system for the country. The EduSat, which will provide a fillip to distance education in the entire country, has specially been configured for the audio-visual medium, employing digital interactive classroom and multi-media, multi-centric system. The satellite has multiple regional beams covering different parts of India - five Ku-band transponders with spot beams covering northern, north-eastern, eastern, southern and western regions, a Ku-band transponder with its 'footprint' covering the Indian mainland region and six other C-band transponders with their footprints covering India.

Connectivity and Phases of EduSat

EduSat is primarily meant for providing connectivity to school, college and higher levels of education and also to support non-formal education, including developmental communication. The scope of the EduSat programme has been planned to be realized in three phases.

i) In the first phase of pilot projects, a Ku-band transponder on board INSAT-3B, which is already in orbit, is being used. In this phase, Visveswaraiah Technological University (VTU) in Karnataka, Y. B Chavan State Open University in Maharashtra and the Rajiv Gandhi Technical University in Madhya Pradesh have been covered.

ii) In the second phase, EduSat will be used in a semi-operational mode with at least one uplink in each of the five spot beams. About 100-200 classrooms will be connected in each beam. Coverage will be extended to two more states and one national institution;

iii) In the third phase, EduSat network is expected to become fully operational. ISRO will provide technical and managerial support in the replication of EduSat ground systems to manufacturers and service providers. End-users are expected to provide funds for this. In this phase, ground infrastructure to meet the country's educational needs will be built and during this period, EduSat will be able to support about 25 to 30 uplinks and about 5,000 remote terminals per uplink.

While ISRO will provide the space segment for EduSat system and demonstrate the efficacy of the satellite system for interactive distance education, content generation will be the responsibility of the user agencies. The indigenous realisation and launch of EduSat will provide a significant boost to countrywide distance education in India.

The BSNL Broadband

Broadband internet is a boon for internet based e-learning solutions. Quick communication is the essence of modern civilization. Broadband allows one to send and receive pictures, songs, videos and heavy documents containing all these at high speed. Thus, with broadband distance dies virtually. Sitting in New Delhi, a teacher can address a student in the Nilgiris.

The broadband services launched on January 14th, 2005 promise to bring numerous small companies and households into the field of this technology. The introduction of affordable and high speed broadband is expected to revolutionize the economy. The BSNL broadband facility will reduce the cost sharply. This will help students and teachers to remain in touch with the rest of the world. Its benefits to educational institutions in small towns will be immense. With cheaper connectivity to the Net, the students of these institutions can equip themselves for future global challenges.

School Online

If all goes well, by 2007, Tamilnadu will be the most wired state in the country from the perspective of e-learning, or e-education. At the core of this Rs.20 crore project to be kicked off during April 2005, is a Knowledge Data Centre (KDC) coming up at Tamil Nadu's Anna University (it is based in Chennai and the government is a partner in this exercise). The KDC will store information in digital format that can be accessed by students across the state. The data center will become a technology resource. The KDC will become the central hub for promoting research activities, apart from disseminating knowledge and offering services such as e-learning, distance learning, a digital library and the like. Already Anna University is a pioneer in e-learning, with its EduSat programmes covering all the 29 DIETs in Tamil Nadu.

Benefits of e-Learning and Training

The benefits of e-learning and training are:

- Anywhere, any time availability,
- Cost saving,
- Flexibility,
- Specific learning, and
- Global interaction with other participants and tutor experts.

Hence e-learning and training have to stay. The e-learning materials at present are available in English only and suitable for teachers and students studying in English medium schools. Developing e-learning materials based on our needs in the regional languages is the need of the hour. This paper is designed to highlight the methods of developing ICT educational training materials with specific reference to situations prevailing in the state of Tamil Nadu.

Table 1: Number of teachers and students in Tamil Nadu

Schools for General Education 2002-2003						
Type of Institution		No. of Institutions	Students			Teachers
			Boys	Girls	Total	
1		2	3	4	5	6
1.	Primary Schools	31678	2093568	1989289	4082857	120524
2.	Middle Schools	6383	1122051	1095169	2217220	59680
	Total	38061	3215619	3084458	6300077	180204
3	High Schools					
	a) State Board	2905	657182	722841	1380023	33439
	b) Anglo Indian	12	2817	7686	10503	272
	c) Matriculation	2059	262745	210726	473471	22800
	d) Central Board (Kendriya Vidyalayas CBSE and I.S.C.)	52	16407	15632	32039	1110
	Total	5028	939151	956885	1896036	57621
4.	Higher Secondary Schools					
	a) State Board	2602	1708401	1553817	3262218	81954
	b) Anglo Indian	129	21195	21568	42763	1211
	c) Matriculation	1391	539163	438888	978051	36160
	d) Central Board (Kendriya Vidyalayas CBSE and I.S.C.)	87	50653	33770	84423	3520
	Total	4209	2319412	2048043	4367455	122845
	Grand Total	47298	6474182	6089386	12563568	360670

12.2 Training Plan for School Teachers

It is obvious from Table 1 that a little more than 1.8 lakh primary and elementary school teachers are working in the state of Tamil Nadu. Providing training to them in ICT skills is a big task. All these teachers must be trained in basic ICT skills before implementing e-learning and training solutions. Since 'Capacity building in ICT enables e-learning solutions' and it is planned to be implemented in six phases as given in Table 2, which will fulfill the present ICT needs of these teachers.

Table 2: Six phases of capacity building in ICT enabled e-learning solutions

Phase	Duties and Responsibilities	Professionals involved
I	Training all teachers in basic ICT skills	Directors SSA/DTERT/DSE/DMS/ DPC/DIET Principal/DEEO/AEEO/BRC Supervisors
II	Need Analysis and Research Team (NART)	Subject Experts, Research professionals
III	Content Development – Design	Subject experts, Practicing teachers, E-learning solution experts
IV	Development of materials in electronic form	Digital developers, Multimedia experts
V	Implementation – Web enabling	System administrators and programmers
VI	Evaluation	NART

Training (Phase I)

Majority of the teachers teaching in elementary schools do not know how to use a computer either for surfing the net or handling the computer based tutorials available in a Compact Disc (CD). All these teachers must be trained to attain the basic skills of computers.

The Plan

In Tamil Nadu there are 1,80,204 teachers working in primary and middle schools. All these teachers must be trained in basic ICT skills on war footing before putting them on e-learning and training. Composition of ICT Education Committees at state, district and BRC levels is given in Table 3.

Table 3: ICT education committees at various levels

Level	Personnel involved	Duties and Responsibilities
I	Directors of SSA/DTERT/ DSE/DMS	• Charting State Level Plans. • Conducting District Officers meeting. • Supervision and evaluation at the State level.
II	District Collector DPC/DIET Principal/Inspector of Matriculation Schools/DEO/DEEOs	• District level planning. • Identifying the viable schools as ICT resource centres for training. • Conducting meeting of the Principals of these schools. • Finalising the mode of action. • Implementing and evaluating the programme.
III	AEEOs/BRC Supervisors	• Allotting teachers to the designated schools on planned dates • Reporting progress to the District ICT committee

Syllabus for ICT Training

The following basic skills have been identified for proposed ICT training:

Skills in using the operating systems:

- Input device, Output device, CPU.
- Mouse operations: Click, double click, right click, drag and drop.
- Keyboard – layout, uses of different keys.
- Parts of a 'Window' – Title bar, Menu bar, Toolbar, scrollbar, Desktop, Taskbar and their uses.
- Start menu – Programmes, Find, Help, My Documents and Shut Down.
- Files and Folders - open, close, cut, copy, paste, moving, naming and renaming.
- Changing Wallpaper, Screen saver and Clock Timings.
- Using Paint, WordPad and Calculator.
- Windows Explorer, Scan Disk and Disk Defragmenter.
- Using Audio, Video and Interactive CDs.
- Internet Explorer, Address bar and Website.
- Internet Explorer – Tool bar buttons – Stop, Refresh, Home, Search, Favorites, URL, Surfing the net, Chatting and hyperlinks.
- E- Mail, Outlook Express, Web based free E-Mail service providers, composing, sending and receiving E-Mails, Attachments and sending same mail to multiple addresses. (Total 60 skills).

Budget

Budget components have considered in two ways (i) time budget and (ii) financial budget.

Time budget: From the experience of the ICT experts it is understood that a 5-day training is enough to attain basic ICT skills. Hence every teacher has to undergo ICT training of 5-day duration. A batch of 20 teachers can be trained at a time. There are 9000 High and Higher Secondary Schools functioning in Tamil Nadu, (Table 1). Out of these 9000 schools the District and Block level committees will identify 3000 schools, which have full infrastructure to conduct the proposed ICT training. Twenty teachers are to be allotted for one batch and on an average 3 batches of teachers will be trained by the resource persons of the schools. To avoid any disturbances in regular classes, these ICT training may be organized during the winter or summer vacations.

Financial budget: The expenditure involved in training all the 1.8 lakh teachers is shown in Table 4. The finance involved in at the four levels namely, school, block, district and state have already been calculated. The unit cost to train a teacher has been worked out as Rs.476/-, which can be rounded off as Rs.500/-.

It can be seen from Table 1 that there are 9,237 high and higher secondary schools in Tamil Nadu. We have to select only 3,000 schools from these as our ICT resource centres. The District Committee taking into account the ICT infrastructure available in each school will do selection of schools.

Table 4: Financial budget

School Level	For using the school ICT infrastructure	Rs.2000
	Honorarium for the principal of the school	Rs.1000
	Honorarium for 2 resource persons of the school (Computer instructors)	Rs.2000
	Out of pocket allowance to participants Rs 30 x 5 days x 20 teachers	Rs.3000
	Stationery Rs. 50 x 20 teachers	Rs.1000
	Total for training 20 teachers	**Rs.9000**
Block Level	Meeting expenses, visiting the schools and reporting to the District Committee by AEEOs and BRC supervisors	Rs.5000
District Level	District ICT meetings	Rs.10000
	Expenses towards visiting the centers by DPC and DIET Principal	Rs.20000
	Collecting feedback and evaluation works	Rs.10000
	Total at District Level	Rs.40000
State Level	Conducting State Level meeting for all District Officials with the State Body (4 times Initial planning- Interim evaluation 1 – Interim evaluation 2 – Final sitting)	Rs.1000000
	Final evaluation, Documentation and Research work	**Rs.500000**

Total expenses to train 1,80,000 teachers and unit cost

Level	Expense/Level/Batch	No of batches	Budget
School	Rs. 9000	9000	Rs. 8,10,00,000
Block	Rs. 5000	385	Rs.19, 25,000
District	Rs.40000	30	Rs. 12,00,000
State	Rs.15, 00,000	1	Rs. 15,00,000
Total			Rs. 8,56,25,000
Unit cost	Rs.8, 56,25,000 / 1,80,000		**Rs. 475.70/-**

12.3 Need Analysis (Phase II)

In Tamil Nadu there are two nodal directorates, which implement teacher training programmes through SSA. These are (i) State Project Director SSA and (ii) Director, DTERT, Chennai. A full-fledged Educational Television (ETV) studio also functions under the direct supervision of Director, DTERT. The ETV studio usually produces audio and video programmes related to elementary education. The video programmes are also telecast by Doordarshan Kendra, Chennai during the educational broadcast like 'Kanbom Karpom' (i.e. Look and Learn). ETV studio produced 32 video programmes for primary and 12 programmes for elementary education last year. The facilities available in the ETV studio can be enhanced to cater to the need of ICT based-production techniques and implement e-learning and training methods.

Need analysis and research is a continuous process. There should be a separate NART team at the state level to find out the training needs of elementary teachers. Syllabus revision, text book revision and introduction of new concepts in school curriculum like crisis management and lesson on tsunami, needs that better first hand knowledge be provided to teachers and by them in turn to the children in elementary schools.

So NART must be in continuous touch with district level professionals and should identify subject areas suitable for meeting the current needs of teachers for developing e-learning content.

This team should also take the responsibility of evaluating the e-learning training programmes after their implementation.

12.4 Content Development (Phase III)

Content development is also a continuous process. Seasoned subject experts, professionals and teachers need to be identified periodically as content developers. Once the content developers are identified, they should be oriented in preparing e-learning contents. Developing content for e-learning needs much broader and in-depth knowledge in different fields. This task is very different from writing a training module for print version. The content developers must be trained to exploit full capacity of the delivery modes of e-learning contents by multimedia experts.

The following steps are involved in content development workshop:

- Customizing learning objectives;
- Potential integration of media elements;
- Preparing training content; and
- Developing and evaluating the prepared contents

Content developers must be oriented to the potential use of various multimedia techniques. E-learning contents will be more effective only when the following multimedia techniques are incorporated in the developmental process. These are:

- Text and animated text;
- Graphic and images;
- Animation;
- Audio;
- Video; and
- Interaction

The content so developed must attract the end users and retain their attention.

12.5 Content Development in Digital Form (Phase IV)

Once the content has been created in house, outsourcing may develop its digital the electronic form. Only multimedia experts using digital multimedia creation tools can develop the e-version of the content. Since this phase involves a lot of technical expertise, work related to this phase can be got done externally. This process is called document processing.

Table 5 provides a synoptic view of different multimedia creation tools.

Table 5: Multimedia digital tools

Media	Formats	Tools
Text	doc, txt, pdf, html	HTML, Adobe Acrobat Reader
Graphic and Image	Bmp, tiff, gif	Adobe Photoshop, Adobe Illustrator, Corel Draw
Audio	WAV, AU, MIDI, MPEG	Macro Media Shockwave, Adobe Sound Forge
Video	MPEG, AVI, Quick Time,	Macro Media Director, Movie star Maker, Adobe Premiere

Animation	.Macro Media Flash, Corel Graphics, Web Painter, GIF Builder
Web Publishing	Microsoft Front Page, Macro Media Dream Weaver
Conferencing	Windows Net Meeting, Yahoo Messenger
Internet Authoring	Macro Media Authorware Professional, Director, Tool Book II
Chat	Microsoft Net Meeting, Internet Conference Pro, Yahoo Messenger

12.6 Implementation (Phase V)

Once the contents are converted into e-form, they can be published through the internet web and even distributed through CDs and DVDs for regular and frequent references.

While publishing in the Web server side applications may be needed for creating dynamic documents, performance tracking, student record keeping and security measures. A programmer can write back end applications that perform these tasks. Web server administration and site maintenance can also be done suitably through third party management. Usually the system administrator of professional e-learning solution provider can look after the work connected with server side scripting, SIT maintenance, server administration, evaluation and updating.

12.7 Evaluation and Feedback (Phase VI)

When e-learning contents are delivered through Web, it is much easy to collect and consolidate the feedback given by the users. Enough scope must be given to the users to record their opinion on-line through on-line feedback questionnaire. NART can collect all these responses on-line and download them for further analysis. After analyzing the responses given by the end users, NART can give their recommendations and suggest appropriate changes in the content delivery mode for future improvement.

12.8 Conclusion

In this paper we have discussed ways and means of ICT enabled e-learning solutions for e-capacity building of primary and elementary teachers. All primary and elementary teachers should be trained in basic ICT skills. For this work, the infrastructure available at present in high and higher secondary schools may be used. Also contents should be available in local language and should focus on local issues faced by teachers and students.

At Present training teachers through e-learning/training mode is only at the infant stage. Lot of research would need to be conducted in this area to find out better ways and means of furthering e-learning solutions in teacher training.

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CHAPTER 13

IMPROVING EFFECTIVENESS OF TRAINING THROUGH TELECONFERENCING: A FOLLOW UP STUDY

Suhasini S. Paramane and Shubhada M. Gokhale

Abstract

Teleconferencing offers a means of interacting with people widely scattered over the region, at the same time and its educational applications pertain to communication with group of learners at different campuses and in different organizations. In Maharashtra this advantage of teleconferencing is utilized for in-service programmes for primary teachers. The in-service training is arranged in two phases: a) training for resource persons through teleconference arranged at DIETs and b) training at beat level through cascade mode by the resource persons from phase 'a'.

The present paper aims to improve teleconferencing as a training technique in cascading mode. It has been found that training through teleconference is very useful for resource persons and its effectiveness depends on availability of regular electricity supply. For training of primary teachers in cascade mode, VCD shows with recording of experts' discussion and interaction session by resource person were found to be more effective. Implications of study would be to improve training at the grassroots level, which can motivate teachers for their professional development.

13.0 Introduction

Teleconferencing is a satellite-based communication technique. It offers a means of simultaneous interaction with people widely scattered over a region. Therefore, transmission losses are near zero. Its educational applications pertain to communication with groups of learners at different campuses and interacting with different organizations. In Maharashtra, Maharashtra Prathamik Shikshan Parishad (MPSP), Mumbai, is utilizing this technique for primary teachers' in-service training at the state level. For this, one-way video and two-ways audio system is used i.e. discussion of subject experts can be watched on television by teachers and then teachers can interact with experts by means of telephone. Electronic chalkboards are used to send written or sketched digital information so that teachers can see chalkboard work as it progresses. In interactive session, teachers have used facsimile transmission to transmit their written or sketched matter. Training on action research, language teaching (regional), mathematics, use of project method in EVS has been arranged since March 2001. The training was arranged in two phases: a) training for resource persons conducted at each district place through teleconferencing arranged by MPSP and b) training of primary teachers from each district at beat level through cascade mode by 'phase a' resource persons. District Institute of Education and Training (DIET) representatives were trained to facilitate the effective transmission of teleconference.

13.1 Statement of the Problem

Improving effectiveness of training through teleconferencing in cascading mode: a follow up study

Operational Definition of Cascade Mode

It is a mode of training, where selected teachers after completing their training through teleconferencing, act as resource persons and train primary teachers at beat level. In cascade mode, resource persons train primary teachers with the help of experiences obtained through the printed material provided during teleconferencing. But there is possibility of some transmission loss. To avoid this, VCDs of teleconferencing were prepared and used as 'VCD show' for the training at the beat level.

13.2 Objectives of the Study

The objectives of the study were to find out:

- the reactions of resource persons who had completed training through teleconferencing arranged at district place about the technique, used during training;
- the reactions of resource persons about the use of telephone facility provided in teleconferencing;
- the reactions of resource persons about TV presentations during teleconferencing;
- the reactions of resource persons about usefulness of printed material provided for teleconferencing;
- the reactions of primary teachers who have been trained by resource persons in cascading mode;
- the method of training used by resource persons, in cascading mode; and
- the most effective method used in training of primary teachers in cascading mode.

13.3 Delimitation

The study has been delimited on the following aspects:

- The study is limited to teleconferences arranged in the year 2003-2004 by MPSP for resource persons.
- The study is limited to training through cascade mode arranged in the year 2003-2004 for primary teachers.
- The study is limited to the training obtained by resource persons and primary teachers in the Sangli district during 2003-04.

13.4 Procedure

The procedure used for the research was as follows:

Sample

Two types of samples used in the study were as follows:

Sample I: for training of resource persons through teleconference: The training was arranged at DIETs for forty selected primary teachers from 8 talukas (No.= 28) and four corporation schools (No. = 12) All these 40 teachers functioning resource persons for data collection in later teleconferences.

Sample II: for training of primary teachers by cascade mode at beat level: One primary teacher from each school was select for this training at beat level. Ten teachers from each of the 8 talukas and 10 teachers from each of the 4 corporation schools were randomly selected for training by cascade mode. Total number of teachers trained through cascade model was 80+ 40 =120.

Sample I: Teachers from 8 Talukas.

District Sangli
Teachers from Talukas / Schools (N=28)

	Miraj	Kavathe Mahankal	Shirala	Walwa	Tasgaon	Jath	Atpadi	Khanapur
No. of Teachers	2	4	4	4	3	4	3	4

Teachers from Corporation schools (N=12)

	Tasgaon	Vita	Miraj	Sangli
No. of teachers	3	4	3	2

Sample II: 10 teachers from each taluka and each corporation school. Total 80+40 = 120

Procedure used for Training

Training through teleconferencing took place in 2 phases.

Phase I: In phase I, 40 primary teachers were trained through teleconference who then act as resource persons for the II ^{P}hase. Printed material about the contents of training was provided well before the training. Using this material and the experiences they had obtained through teleconference, they were expected to train primary teachers at beat level. The same group of resource persons was utilized for every teleconference for a specific subject.

Phase II: In Phase II, one primary teacher from each school was called for training at the beat level. These teachers were trained by the resource persons using the printed material provided for this purpose and the experiences they had obtained through Phase I teleconferencing. In the year 2003-04, four districts in Maharashtra (including Sangli) used VCDs of teleconferences to impart training at the beat level. During facilitator's training at MPSP, Mumbai, the issue was discussed and it was discussed that responses for such training be collected and analyzed. It was therefore, decided to collect the data about the training at beat level in district Sangli in which VCD shows had been used

Schedule of Teleconferencing

The schedule of trainings through teleconferencing selected for this study was as follows:

a) Mathematics Education: 6th -7th Oct.2003.
b) Regional language Education: 9th -10th Oct.2003.
c) Mathematics Education: 9th -10th Feb.2004.
d) Regional language Education: 12th -13th Feb.2004.

At beat level these training were organized on data indicated below:

a) & (b) on 17th -20th Oct. 2003 and (c) &(d) on 10th -13th March 2004.

Tools Used

Tools used for the study were as follows:

1. Feedback opinionnaire to obtain feedback from resource persons about training through teleconference. It was prepared by MPSP, Mumbai (Appendix A)
2. Questionnaire for Primary teachers (QPT) to obtain reactions about training obtained from resource persons at beat level (cascade mode). QPT was prepared and standardized by the researchers. (Appendix B)

Feedback opinionnaire was administered after each teleconference. The data used for this analysis is from the feedback opinionnaire administered after the last two rounds of teleconferencing. i.e. Mathematics Education on 9th-10th Feb. 2004 and Regional Language Teaching on 12th-13th Feb. 2004. Similarly, QPT was administered at the beat level after their training sessions imparted by resource persons i.e. on 7th-8th and 10th -11th March 2004.

13.5 Analyses and Interpretation of the Data

The data is analysed by calculating percentage of total reactions obtained from primary teachers. The results of analysis and interpretation of the data are as follows.

Analysis of Data Collected Feedback Opinionnaire

Reaction of resource persons about the use of telephone facility provided is shown in Table 1.

Table 1: Reactions about use of telephone facility

Reactions about effective use of telephone facility	No. of responses obtained				%
	M*	L*	Total	Average	
Positive reaction	37	34	71	35	88
Uncertain reaction	3	6	9	5	12
Negative reaction	0	0	0	0	0
Total	**40**	**40**	**80**	**40**	**100**

(M*- Mathematics; L*- Language)

Data in Table 1 reveals that 88% of resource persons responded positively about effective use of telephone facility provided during training through teleconferencing; no one provided any negative reaction about the use of this facility.

Reactions of resource persons about presentations on TV during training through teleconferencing are as shown in Table 2.

Table 2: Reactions about usefulness of presentation on TV

Reactions about presentations on TV	No. of Responses				%
	M*	L*	Total	Average	
Positive	37	37	74	37	93
Uncertain	2	3	5	2	5
Negative	1	0	1	1	2
Total	**40**	**40**	**80**	**40**	**100**

(M*- Mathematics; L*- Language)

It can been seen from the data in Table 2 that 93% of resource persons responded positively about usefulness of presentations on TV during teleconferences only. One respondent expressed negative reaction about usefulness of presentations on T.V.

Reactions of resource persons about the usefulness of printed material provided for teleconferences are shown in Table 3 below:

Table 3: Reactions about usefulness of printed material

Reactions about usefulness of printed material	No. of Responses obtained				%
	M*	L*	Total	Average	
Positive	37	37	74	37	93
Uncertain	2	3	5	2	5
Negative	1	0	1	1	2
Total	**40**	**40**	**80**	**40**	**100**

(M*- Mathematics; L*- Language)

Observation

93% respondents indicated positive reaction about the usefulness of printed material provided for teleconferences. Incidentally, respondents' reaction to usefulness of printed material is identical to that about usefulness of T.V. presentations during training through teleconferencing.

The responses indicate that on the whole the resource persons found telephone, presentations on TV and printed material provided during the training very useful and feel that these made the training through teleconference quite effective.

Respondents' general remarks about teleconference were also analysed. Most common general remarks and their % are shown in Table 4 below:

Table 4: Analysis of respondents' general remark

Analysis of general remark	No. of Responses obtained				%
	M*	L*	Total	Average	
Use of continuous electricity supply	24	34	58	29	73
Training period should be increased	12	12	24	12	30

(M*- Mathematics; L*- Language)

Data in Table 4 reveal that 73% resource persons made a general remark that constant availability of electricity supply made the transmission effective, another 30% resource persons were of the view that training period should be increased.

Even though most resource persons felt that constant availability of electricity supply made transmission effective. They were unaware that inverter instead of generator' was used many a time to ensure the availability of electric supply.

Analysis of the Data Collected from QPT

Information obtained from primary teachers about methods of training used during the last training and their % is shown in Table 5.

Table 5: Methods used

Methods	No. of Responses obtained				%
	M*	L*	Total	Average	
a) Lecture demonstration (lec-dem)	7	9	16	8	6
b) VCD show with complete recording of teleconference	12	16	28	14	12
c) VCD with recording of experts' discussion & interaction session by trainer himself	101	95	196	98	82
d) Any other	0	0	0	0	0
Total	**120**	**120**	**240**	**120**	**100**

(M*- Mathematics; L*- Language)

Data on Table 5 reveal that VCD with recording of experts discussion and interaction session was the most used method by the resource persons during the last training, Lec-dem was the least used method and VCD was complete recording of teleconference was also used only occasionally.

Table 6 provides information in terms of respondents' reaction about the most effective method used during the last training.

Table 6: Reactions about the most effective method

Methods	No. of Responses obtained				%
	M*	L*	Total	Average	
e) Lecture demonstration (lec-dec)	0	2	2	1	1
f) VCD show with complete recording of teleconference	17	7	24	12	10
g) VCD with recording of experts' discussion & interaction session by the trainer himself	92	90	182	91	76
h) Any other	11	21	32	16	13
Total	**120**	**120**	**240**	**120**	**100**

(M*- Mathematics; L*- Language)

Data in Table 6 is self-explanatory. Almost three-fourths of the respondents found VCD with recording of experts' discussion and interaction sessions most effective while lec-dem was considered to be the least effective. Use of other methods came a distant second in terms of its effectiveness. VCD show with complete recording of teleconference was considered to be still less effective.

13.6 Major Findings

Major findings of the study were as follows:

- Majority of the resource persons getting training through teleconference found that, availability of telephone facility, presentation on TV and printed material were quite useful;
- Majority of the resource persons (almost three fourths) made the general remark that effectiveness of the training was completely dependent on constant electricity supply while about one-third felt that the training period should be increased so that discussion and interaction sessions could be more effective.
- Most participant teachers found that VCD show with the recording of expert's discussion and interaction session by trainer himself made the training more effective in cascade mode.

13.7 Suggestions

The following suggestions emerge from the results of this study:

- Since teleconferencing technique is effective only when constant electricity supply is available, alternate arrangements should be made to each DIET to ensure that training become more effective and is not interrupted due to power failure.
- The benefits of training through teleconferencing are available to only a limited number of teachers (working as resource persons). To ensure that these reach at the grassroots level, use of VCD show would be very effective; as transmission loss is almost nil, primary teachers get full experience of experts' discussion. Moreover, teachers can use these VCDs further personally or in group at any time to understand the concepts. Therefore, it is suggested that, a computer with CD writer should be provided to each DIET so that VCDs of the transmission are made available to all resource persons. Similarly, in case the transmission is disturbed due to technical problems, VCDs from other DIETs could be used to continue the training.
- The training period should be increased by at least one day to make the training more effective.
- Under Research head, there should be special provision for research-based training through teleconference and its follow up.

13.8 Conclusion

- Majority of the resource persons find that the technique of teleconferencing is quite useful but its effectiveness is highly dependent on constant supply of electricity.
- Today, teleconferencing is normally organized for 2-3 days and the training schedule is very tight. To assimilate information properly and to link up the experiences from printed material and from knowledge received through experts' discussion during interaction sessions, the time available to by teachers may be increased by one day.
- For training primary teachers in cascade mode VCD shows with recording of experts' discussion and interaction session with resource person are relatively more effective

APPENDIX-A

Feedback Opinionnaire (English version)
(For resource persons)

Name of the resource person- Occupation-

Tick marks the appropriate choice.

Sl. No.	Statements	Agree	Uncertain	Disagree
1.	Use of telephone was quite effective			
2.	Presentations on TV/illustrative examples/ transmitted graphics were useful.			
3.	Printed material provided was quite useful			
4.	A general remark about the training to make it more effective.			

APPENDIX-B

Training on Language/ Mathematics Education 2004
Questionnaire for Primary Teachers (QPT)
English version

Name of the teacher- Centre where training was received-

Taluka: Date:

Tick marks the appropriate choices (one for each item).

1. Have you received any training from resource persons trained through teleconferencing? Yes/No
2. Which method(s) was used for the last training?
   a) Lecture demonstration method.
   b) VCD shows on television throughout the day and group work.
   c) VCD show on Television of experts' discussion and interaction with resource persons along with group work.
   d) Any other.
3. Which method do you feel to be more effective?
   a) Lecture demonstration method.
   b) VCD shows on television throughout the day and group work.
   c) VCD show on television of experts' discussion and interaction with resource persons along with group work.
   d) Any other.

4. In what respect was the training received by you effective?

   a) In depth knowledge by experts.
   b) Different views about concepts during discussion & interaction.
   c) Innovative teaching techniques.
   d) Creative group work.
   e) Any other.

5. Any suggestions

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CHAPTER 14

EFFECTIVE USE OF ICT THROUGH MULTI MEDIA PACKAGE – A STRATEGY FOR PROMOTING GIRLS EDUCATION AT ELEMENTARY STAGE

Sujata Pattanaik

Abstract

This paper explores the use of multi-media package (MMP) as a strategy for promoting girls' education at elementary stage in three districts of Orissa with low female literacy viz., Kolohandi, Malkangiri and Navangpur. The MMP was developed for fixed target population comprising parents, MTAs, Sarpanchs, VECs, out-of-school children of school-going age and members of community. Three media viz, print, audio and video were used for this MMP. Training, teleconferencing, radio broadcast and folk media were used as delivery modes. The MMP was aimed at students of Class I-VII. It was implemented through committees at the state, the district and the sub-district levels i.e. block, cluster and village. State and District Level task forces were used for planning, implementation of MMP through four phases. Pretests and posttests were used for data collection through two tools. (a) Teachers' Questionnaire and (b) Gender Awareness and knowledge Test. The paper concludes with a set of suggestions for making education of girls especially in tribal areas of Orissa a success story.

14.0 Introduction

ICT through multimedia process and transfer of communication technology can train people to acquire new skills required in various segments of education. Use of ICT has the potential to provide education and training experiences on a recurrent basis, to a large clientele without taking them away from their work place. ICT has given rise to dynamic media and methodology, which can be attributed to its following features:

- decentralized nature of the new technology;
- learners have access to a variety of learning resources;
- makes available up-to-date information from authoritative and reliable sources from any part of the world;
- learner interactivity; and
- encourages learners to receive information in a variety of formats.

14.1 Significance of Multi Media Packages (MMPs)

Multimedia packages have the potential to generate dialogue between the trainer and the trainee(s). Different modes of communication are examples of media (letters, television, films, communication). Media can be used for enrichment as well as instruction. Enrichment sometimes called indirect teaching may add to learners' understanding in a general way. Integrating a variety of media or multimedia into a course offers learners the opportunity to use their own strengths. Multimedia packages have a positive impact towards sustainability and achievement of specific instructional / desired results.

Keeping in view specific learning objectives different multimedia packages have been found to have different levels of effectiveness. Multimedia packages are more effective with respect to achieving specific objectives / learning.

Multimedia packages have the following features that make them important.

Features of the Package: Multimedia Packages have the Following Features that make them Important

- Promote steady positive increase in learner's attitude, motives and mastery level of learning.
- Provide reinforcement for attainment of goals.
- Derive pleasure and create awareness
- Quick and intensive spread of the messages.
- Reach the unreached.
- Stimulate learning.
- Develop communication skills and urge for better achievement.
- Support learning of new concepts.
- Explore learners' divergent needs, expected learning experiences, socio-economic and cultural background.
- Adopt communication technology.
- Reduce conflict and communication gap.
- Can support promotional strategies for increasing enrolment of girls.
- Facilitate affinity toward girls and their education.
- Empower community.

Dimensions of MMPs

In order to ensure greater support for girls' education through MMPs, sustained collaboration with the community in identified clusters is extreme important. MMPs have the three dimensions viz: men, media, and material. These have been briefly described below:

Men

- Community mobilisation through awareness campaigns.
- Training programmes for community leaders, teachers, self help groups (SHGs), Mother Teacher Association, (MTA), and female activists.
- Use of training modules (Teachers' training module, VEC module etc.)
- Campaign monitoring and supervision.
- Feedback and assessment.

Media

- Audio – Teleconferencing
- Video – Audio conferencing
- Print – Video conferencing
- Radio – Interview
- Folk Media

Materials

Audiocassettes, VCDs, short films poster, pamphlets, leaflets, T.V. sets, banners, playcards, mobile van, rally, padayatra, radio broadcast, training, advocacy/promotional print materials and self-learning materials (SLMs).

14.2 Objectives of Multi Media Packages for Promoting Girls Education

MMPs one of the strategies for promoting girls' education were used in the present study with the following objectives:

- to promote community mobilisation (gender sensitization and girls education);
- to improve low literacy rate in educationally backward areas;
- to increase enrolment of girls in schools;
- to increase retention of enrolled girl students; and
- to support quality education

DEP-SSA provided the broad idea on the rationale of adopting, multimedia packages and highlighted the important considerations that were to be taken into account, these are mentioned below:

- Making learning joyful.
- Increasing girl's participation and community mobilization for SSA.
- Encouraging community support to school in providing quality education.
- Ensuring proper monitoring, use of MMP and commitment of the target groups.

Planning and Development of MMP

Proper planning and development of MMPs is a pre-requisite for making promotional MMPs for achieving the objectives of Sarva Siksha Abhiyan along with gender sensitization, community mobilization and girls' participation in school. Accordingly an MMP was planned by taking in to account, clear-cut objectives and felt-needs of the target groups. Effective use of men, media and materials and different delivery strategies are no less important considerations in developing MMPs.

It was decided that the package would developed consist of different media e.g. print materials, audio, video materials, radiobroadcast, posters, calendars, T.V. broadcast, teleconferencing and face-to-face interaction (training) short films, audio cassettes, pre-test tools, live folk performances (street play), monitoring and supervision.

To start with, the MMP was based upon experiences, which were shared through general discussion on community mobilization activities with special reference to enrolment of girls and possible means of addressing these issues.

The MMP on gender sensitization was implemented in 3 districts based on the following criteria.

- Needs of the districts (with inputs from the people from the district.
- Finalization of media / materials to be used in the package.
- Preview / selection of available media for adoption / use in the programme.
- Finalizing the programme delivery strategies.
- Preparation of an action plan / mode of implementation for the programme (at state, district, block and cluster levels).
- Work plan for monitoring and evaluation.

Implementation Strategy of MMP

A comprehensive outline of the Multi Media Package was prepared with inputs from different areas.

i) Target Districts

Three educationally backward districts, low in literacy and enrolment viz. Malkangiri, Nawarangpur and Kalahandi were selected for implementing the MMP. The literacy rate and enrolment statistics in these districts are as under:

Literacy Data: District-wise

District	Male	Female	Total
Malakangiri	41.21	21.28	31.26
Nawaragnpur	47.37	21.02	34.26
Kalahandi	62.88	29.56	46.20

Enrolment Data: District-wise

Enrolment	Male	Female	Total
Malkangiri	71.13	61.72	66.97
Kalahandi	76.73	70.94	74.11
Nawarangpur	58.56	41.57	50.57

ii) *Target Groups for MMP (Trainees to be registered for the package)*

Teachers, BRCCs and CRCCs

iii) *Target Population (for which the registered trainees were to work)*

- Parents (specific focus on mothers)
- Sarapanches, ward members / Zilla Parisad members
- Mother Teacher Associations (MTA)
- Village Education Committees (VEC)
- Out of school children for enrolment in school and for retention
- Youth (males and females)
- Community members

iv) *Target classes (for which target population was work)*

The mobilization activity was to support enrolment and retention for classes I-VII. Class VIII is an integrated one in high schools in these districts.

v) *Media and Materials*

The following media and materials have been used in the multimedia package:

Print

1. Badges (for newly enrolled children for motivation and identity).
2. Identity Cards (for the registered trainees).
3. Greeting cards (with a message on SSA and wish for cooperation).
4. Leaflets (Informative specifying SSA objectives, need for community mobilization and gender sensitization).
5. Pamphlets (single page low-cost for wider circulation).
6. Posters (good quality and durable).
7. Wall calendars.
8. Cloth banners (during launching of the campaign at selected points).
9. VEC module developed by state.
10. Programme guide (highlighting programme objectives).
11. Teacher Training module "SIKHA" on Girls Education.
12. Awareness Testing Tools on education and gender (as a pre-testing tools for impact assessment (see Annexture-II).

Audio

Audio cassettes were developed and produced with selected contents of 21 programmes; these included cassettes, chorus songs, individual songs, dialogues, slogans, dramatized songs etc.

Video

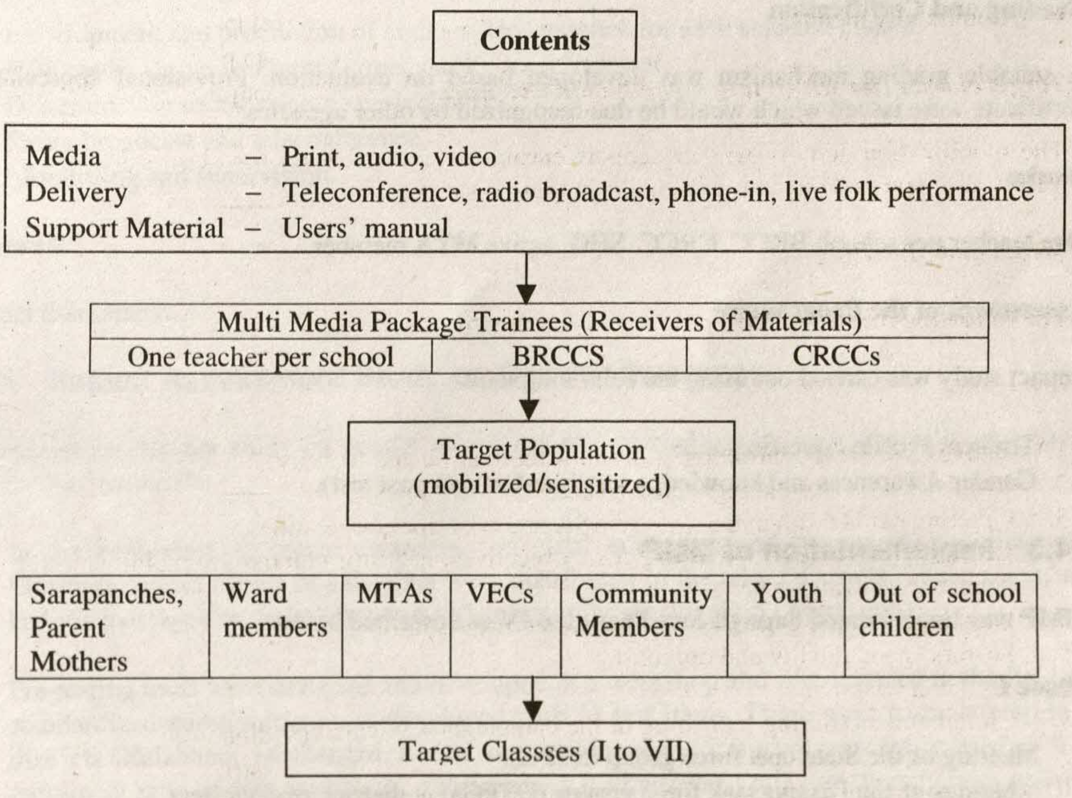
1. 5 short films were developed each of 20-24 minute duration. One short film exclusively in tribal dialect.
2. 5 spots developed on girl's education, each of 2-minute duration.

The cassettes contain features like case study, dramatization, successful events and stories etc.

Delivery Mode (for target group registered for the package)

- Trainers Training
- Orientation and training through teleconference
- Radio broadcast
- Monthly review meetings
- Folk media (live group performance by local artists)

Training Deign for Multi Media Package


Contents
Media – Print, audio, video
Delivery – Teleconference, radio broadcast, phone-in, live folk performance
Support Material – Users' manual
Multi Media Package Trainees (Receivers of Materials)
One teacher per school
BRCCS
CRCCs
Target Population (mobilized/sensitized)
Sarapanches, Parent Mothers
Ward members
MTAs
VECs
Community Members
Youth
Out of school children
Target Classses (I to VII)

Children of school going age 6-14 years (special focus on enrolment of girls education)

Implementation, Monitoring and Supervision

Implementation was at state, district and sub-district levels.

State Level: A task force group (TFG) was constituted and it coordinated, implemented and supervised the programme with 9 members. Nodal officials at the district and the sub-district level were responsible for implementing the programme.

District Level: District task force group, District coordinator for Multi Media Package/gender coordinator/NPEGEL coordinator.

Block Level: BRCCs.

Cluster Level: CECCs.

Village Level: Chairman of VEC/Village Padhan, School H.M./MTA.

Evaluation of Trainees

The trainees were asked to submit the following documents/forms to facilitate assessment:

- Assignments
- Case studies
- Field reports
- Self-appraisal forms/reports

Grading and Certification

A suitable grading mechanism was developed based on evaluation. Provisional appreciation certificate were issued which would be due recognized by other agencies.

Intake

One teacher per school, BRCC, CRCC, SHG, active MTA member.

Assessment of the Programme

Impact study was carried out using the following tools:

- Trainers Profile / questionnaire.
- Gender Awareness and knowledge test (pre-test and post test).

14.3 Implementation of MMP

MMP was Implemented through four Phase I to IV as described below:

Phase I

- Meeting of the State task force group (STFG).
- Meetings of the District task force groups (DTFGs) at district headquarters.

Activities

- SRG formed and oriented the DRG.
- DRG (20), BRG (15), CRCCs (15), NPEGEL (3) were oriented.

- Stress on providing feedback on different aspects regarding girls education.
- Selection of focused clusters / villages;
- Formation of District task force groups/ DRG/BRG Block level monitoring and supervision committee/ cluster committees.
- Selection of media (folk media, puppet shows, production of local songs, video, short film, provision of mobile van with T.V. set.)

Phase II: Launching of MMP

District level launch of MMP was taken up with the following listed programmes and activities:

Activities

- Propagation of messages of the programme to the community in general.
- Exhibition of posters playcards, banners, print materials.
- Use of electronic media like microphone, public address system, audiocassettes, video programmes.
- Rally and padayatra.
- Community participation.

Phase III

A Training Programme 'Poorva' for teachers on issues, problems and strategies relating to adolescent girls was taken up with the following activities:

Activities

- Development and production of audio-video cassettes for each selected cluster.
- Folk media shows (cultural / street show) in each cluster.
- Dissemination of materials to each cluster.
- Radio broadcast and teleconference.
- Monitoring and supervision.

Phase IV

Impact assessment.

14.4 Impact Assessment Study on Gender Awareness

An impact assessment study on gender awareness was carried out by using the following tools and media / materials:

- In the beginning, to create awareness on girls' education and community mobilization. Eleven thousand copies of calendars were distributed in the target districts. These calendars had the messages on girls education and community sensitization (Annexure-I)

- Pre-testing tools were designed and developed in a workshop and administered in the field. A standardized questionnaire was developed with 13 test items. These were administered in 3 districts (Kalahandi, Malkangiri, Nawarangpur). These districts were selected because of low enrolment ratio of girls in schools, educationally backwardness and low literacy rates of boys and girls. Twenty clusters were selected in each of these districts (see Annexure-III).

- Pre-testing tools (Annexure-II) were administered to 300 teachers, VEC members, MTA, PTA, AWW and female activists etc. in various clusters and blocks selected randomly. Data was collected and analysed.

14.5 Findings

The following are the findings of this study:

- *Community participation* is generally around 25% only in these districts (Kalahandi 25%, Malakangiri23%, Nawarangpur 22%).
- *Parental attitude* towards girl's education is quite low (only 37.02%.). and it possibly has negative impact on girl's education.
- *Rural-Urban disparity:* Girls' enrolment is poorer in comparison to that of boys, in rural areas literacy rate of girls is quite low. Low enrolment of girls is reflected as by the follow data:

Enrolment %: Boys and Girls in Rural-Urban areas

	Boys	Girls
Rural	42.03	37.82
Urban	38.55	27.28

- *Wastage:* It was found that dropout /wastage rate is higher for girls compared to boys.
- *Community awareness:* There is lack of awareness in the community toward girls' education. Only 33.02% of the community is aware that girls too should be enrolled in schools.
- *Community participation in school:* It needs to be increased. Community participation in schools is very low (23%).

14.6 Suggestions and Recommendations

The following major suggestions emerged from this study:

- Development of awareness programme needs to be carried out through media campaign.
- Repeated campaign should be launched in remote clusters to increase community awareness about girls' education.
- Sensitization programmes on SSA/Girls/AIE need to be taken up at frequent intervals in collaboration with NPEGEL and KGBV.
- Attitudinal changes for developing positive attitude for girls' education can be promoted through face-to-face interaction and interviews.
- Culture related programmes using folk dance and with a message for increasing girls' enrolment in schools need to be taken up in remote clusters.
- Use of print materials in tribal dialect can be more effective in these districts.
- Audio-video programmes in tribal dialect may be developed and used to promote girls' education, gender parity and greater retention in schools.
- Motivational programmes like drama, dialogue, songs, feature films etc need to be organized in these districts.
- Radio programmes in local languages may be conducted frequently.

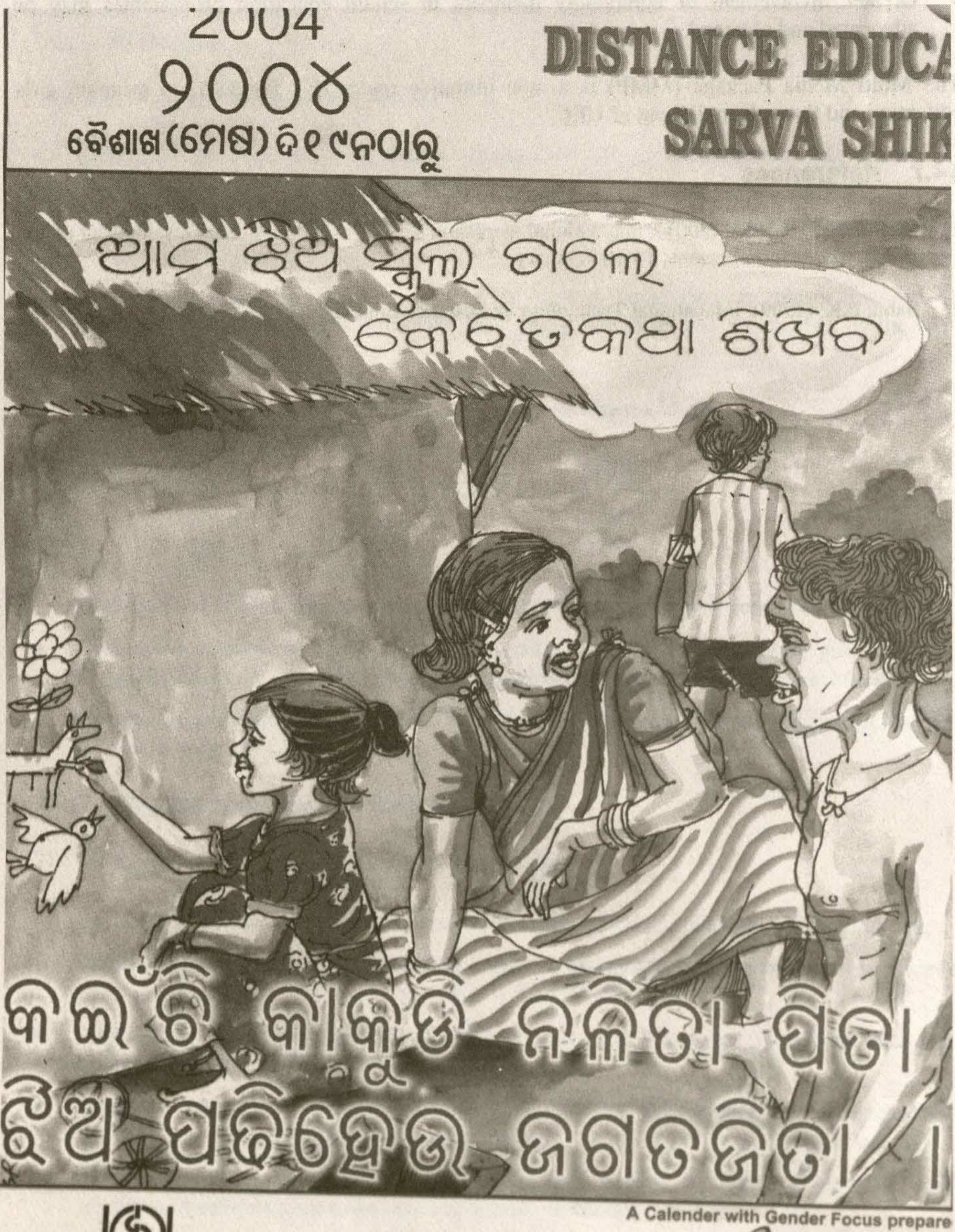
- Regular feedback on awareness campaign needs to be collected and Padayatra and rally may be conducted in cluster where awareness levels are low.
- Greater involvement of community members in school education programmes may be advocated and obtained.

The Multi Media Package (MMP) is a new initiative under ICT for SSA, to promote girls education and through attainment of UEE.

14.7 References

1. DEP-DPEP, IGNOU (2001). International workshop on ICT for professional Development of Primary Education Persons, 14-16 February.
2. Sahu, P.K. (1999). Educational Technology in Distance Education.

Annexure-I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କଇଁଚି କାକୁଡ଼ି ନଳିତା ପିତା ।
ଝିଅ ପଢିହେଉ ଜଗତଜିତା ।
A Calender with Gender Focus prepare
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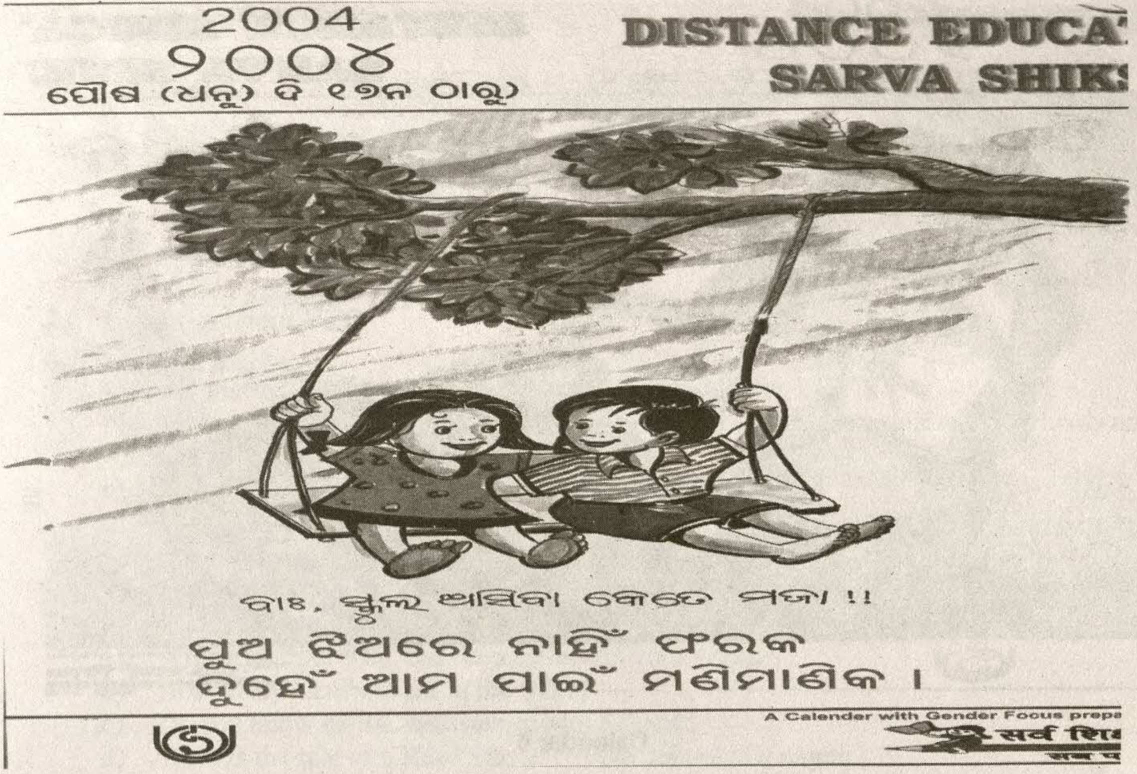
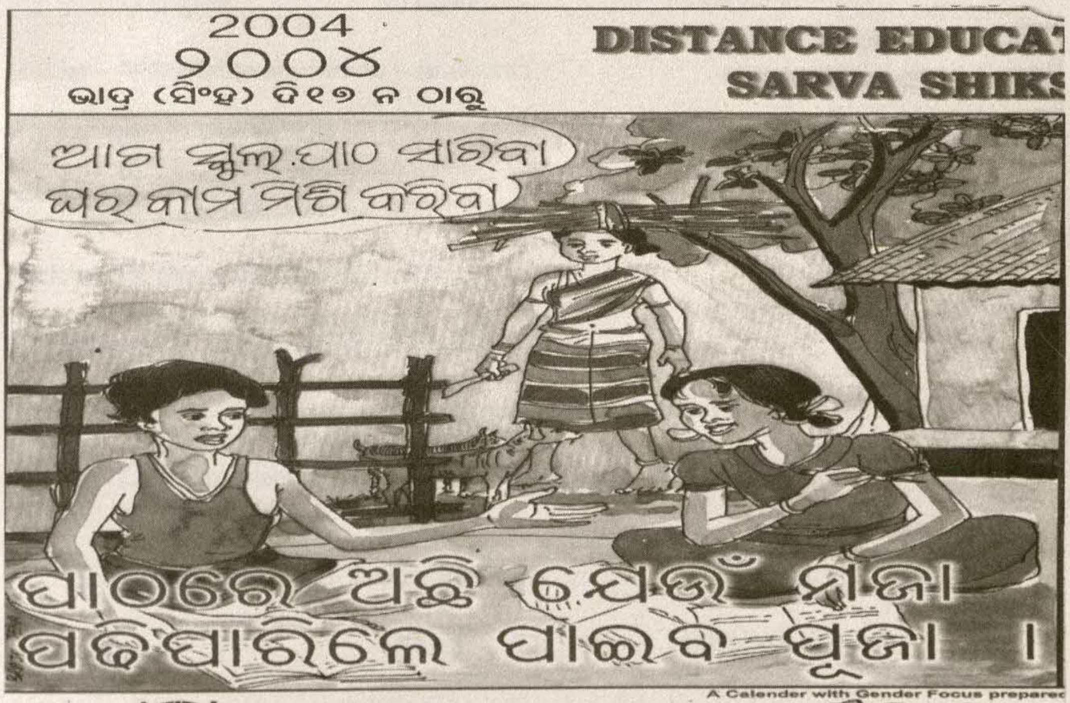
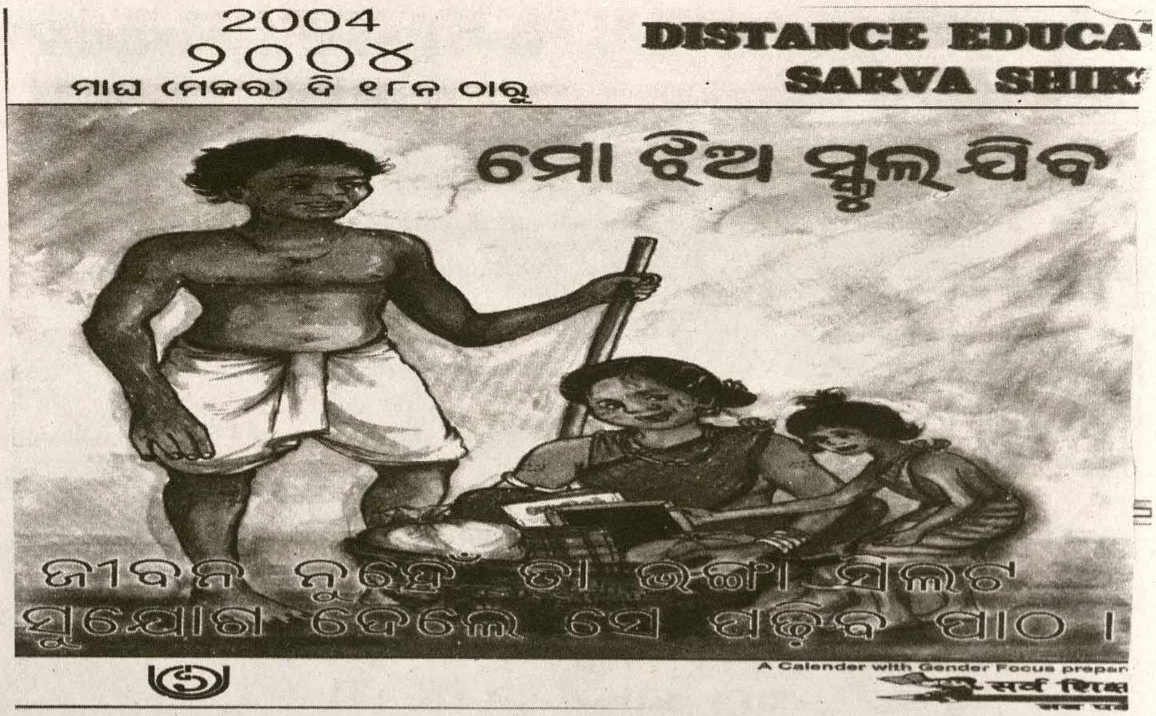
Calender 1



Calendar 2



Calendar 3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Calendar 4

Annexure-II

Pre-Testing Tools MMP for Gender Sensitization

1. Participants' Particulars

i)	Name	ii)	Designation
iii)	Present address	iv)	Educational Qualification

2. Concepts about UEE

a) What programmes are being organized in our state for UEE?
b) What is the exact time period for enrolment of 6-14 years old children in Schools under SSA?
c) Which are the special focus groups under SSA?
d) What is the time frame of UEE in the villages?

3. VEC Formation

a) Whether or not VEC has been formed in your village?
b) How many members are in the VEC?
c) Do you know the Headmaster of your School?
d) What is the role of a Head Master in your school in a month?

4. Information Regarding Own Area

i) Literacy rate of your district in comparison to that of your State is

a) Higher   b) Lower   c) the same

ii) Women literacy rate in your district

a) 10% to 20%
b) 20% to 30%
c) above 30%

Tick mark the appropriate answers:

5. Reasons of Low Literacy of Girls

a) Lack of community interest towards girl's education
b) Availability of co-educational schools
c) Low enrolment rate of girls in schools
d) All of the above

To whom do you like to provide education?

i) Boys   ii) Girl   iii) Both of them

Dropout rate is more in case of

i) Boys   ii) Girl   iii) Both of them

6. Towards Gender-Sensitization

a) There should be more female teachers in schools.

Agree / disagree / partially agree

b) We should consult female members of a family for taking any decision.

Agree / disagree / partially agree

c) Special games in which girls are interested may be arranged during sports/games competitions.

Agree / disagree / partially agree

d) Boys and girls should sit together in classrooms.

Agree / disagree / partially agree

e) Examples of female characters should be highlighted in the curriculum.

Agree / disagree / partially agree

f) Leadership by girls should be emphasized in the conduct of different activities in schools.

Agree / disagree / partially agree

7. List the activities taken up by boys, girls and boys as well as girls in the home and at School.

Boys	Girls	Both	School	Home

8. List three reasons of why girls absent themselves from schools?

9. Children (6-14 years) are generally found absent from school because (Give any two reasons)

10. What strategies would you use for ensuring regular attendance of girls in schools (List any two).

11. If you are given the responsibility of girls, what steps would you adopt for their regular education?

12. If a girl gets education, She

- Is able to earn her livelihood.
- Ensure healthcare, childcare & family welfare.
- Can develop confidence in taking care of family.
- Can ensure education for other girls too.
- Becomes aware of girls' and women's' rights.
- Can avoid child marriage.
- Can have better knowledge about family planning.
- Can develop leadership qualities.
- Can become capable of taking decisions and participating in different events.

13. Social Status

- Both boys and girls should have equal opportunities for food, education and personal care
- Equal responsibilities should be given to both boys & girls
- Equal freedom should be given to both boys as well as girls.
- Girls and Boys should have equal opportunities to take up any profession.
- Women and men should receive equal wages for the same work/job.
- Both males and females should have equal right to take decisions in a family.

Annexure-III

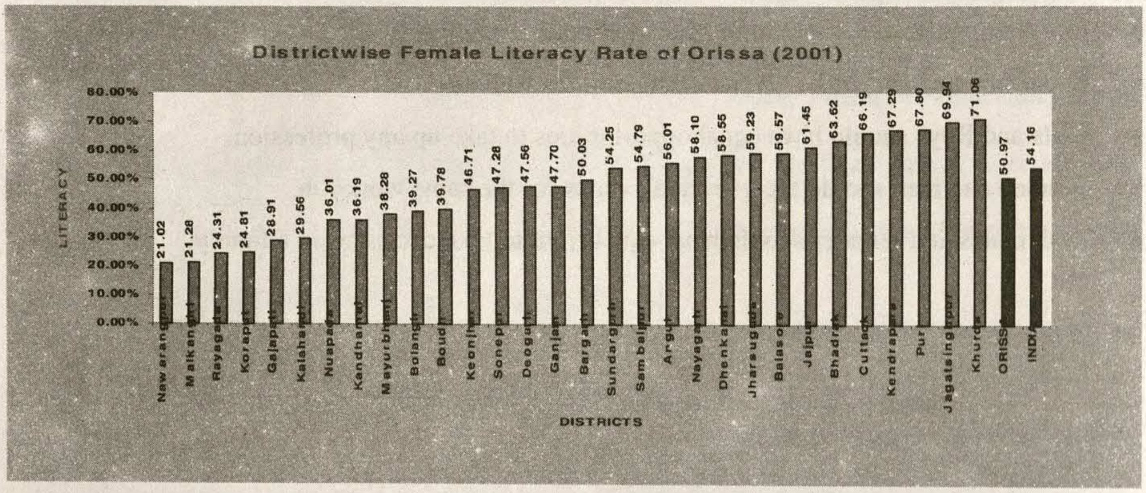


Fig.14.1

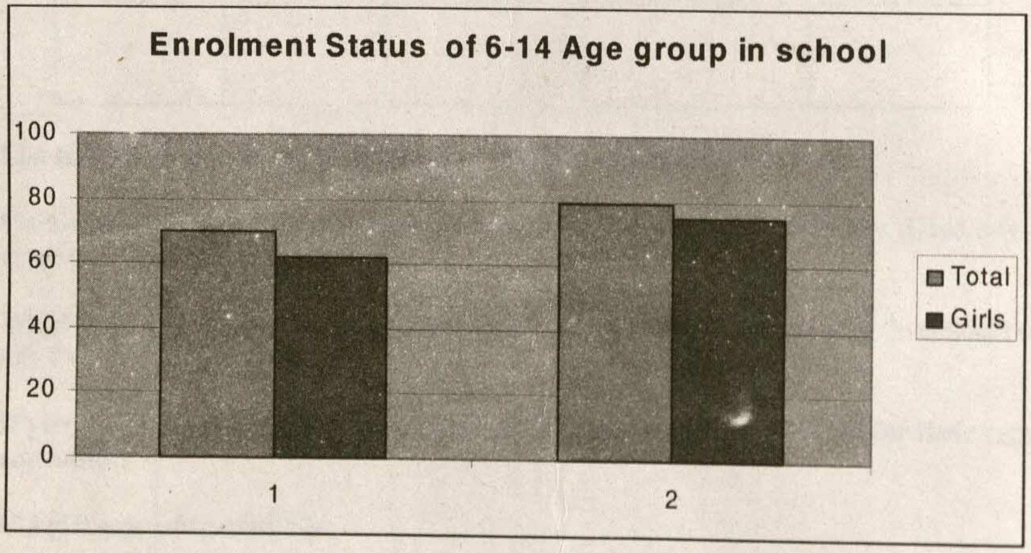


Fig.14.2

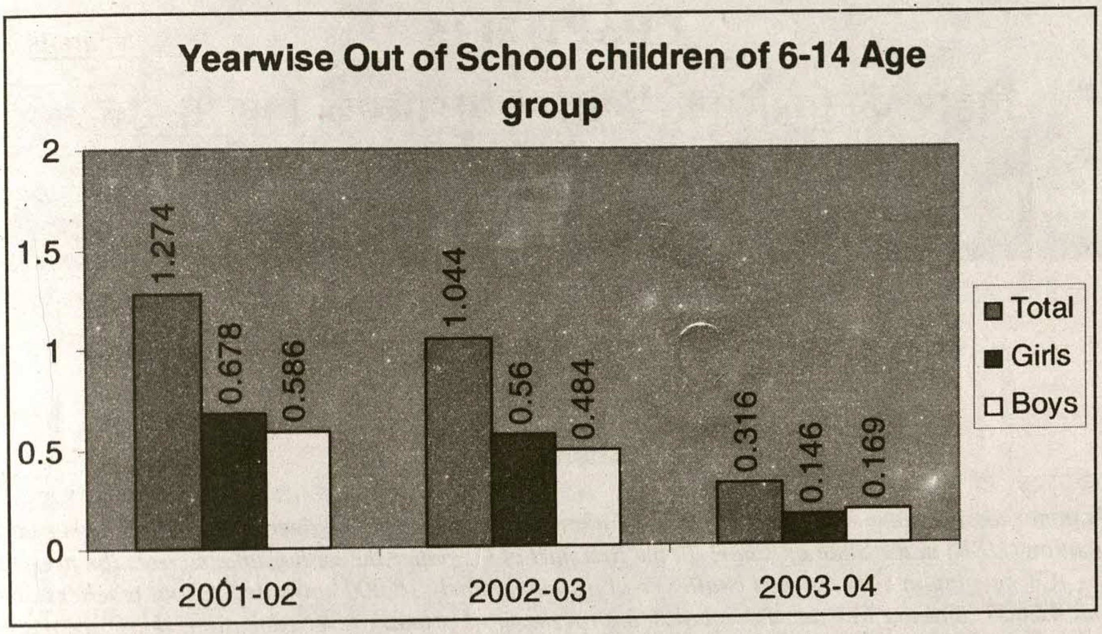

Yearwise Out of School children of 6-14 Age group
2
1.5
1
0.5
0
1.274
0.678
0.586
1.044
0.56
0.484
0.316
0.146
0.169
2001-02
2002-03
2003-04
Total
Girls
Boys

Fig.14.3

CHAPTER 15

बिहार के प्रारम्भिक शिक्षा में गुणात्मक विकास हेतु ICT आधारित सामग्री निर्माण एवं उपयोग की सम्भावनाओं का विश्लेषणात्मक अध्ययन

सुभाष चन्द्र झा

Abstract

This paper analyses the scope and perspective plan of ICT potential in universalisation of elementary education (UEE) in the State of Bihar. In the first part of his paper,the author underscores the need of using ICT keeping in view the vast challenge of training, nearly 16,000 untrained school teachers and about 42,000 'Shiksha Mitras'. For quality improvement of primary level education, there are many challenges that need to be addressed. The author cites referral analysis by SIET, Patna, Bihar about the low professional profile of these primary school teachers viz. shortage of teachers, disproportionate concentration of teachers of senior age-group, deficiencies in subject knowledge, weak pre-service teacher training, deployment of teachers in duties other than teaching, weak status of block-resource and cluster-resource centres, absence of need-based teacher-training programmes and bureaucratic bottlenecks in teachers' recruitment causing delay in the induction of teachers for filling-up the vacancies in primary schools.

In the next part, the author outlines the suggested perspective plan for using ICT in the context of SSA in the State of Bihar. The paper provides about the use of ICT in terms of: computer-based learning; development and distribution of self-instructional learning material (SLMs), CD-ROMs, DVDs, multi-media CDs (MMDs) and making available web-sites/internet for interactive teaching. The author suggests a well-planned strategy based on assessment of ground realities and research which should emanate from the District Institutes of Education and Training (DIETs) and the enlightened resource persons picked up from various blocks and clusters. He suggests formation of various groups for the development of ICT based resource-materials – academic group, and groups of producers and media experts. The resource material thus developed should be further refined through constant feedback about its quality and relevance. In the end, the author links-up ICT resources and material production processes to EduSat. He identifies ten areas which require development of resource materials in the form described earlier. He also suggests logistics for the implementation of this perspective plan of ICT use under SSA by.making administration proactive through proper coordination between SCERT, SIET, DIETs, SSA offices and administrators of education department to ensure adequate financial support expertise and infrastructure and success of training programmes through feedback based evaluation.

15.0 पृष्ठभूमि

21 वीं सदी सूचना–प्रौद्योगिकी की सदी है। आज आई.टी. के क्षेत्र में हो रहे नित नए–नए आविष्कारों और प्रयोगों से सम्पूर्ण विश्व एक परिवार के रूप में सिमट गया है जिसे ग्लोबलाइजेशन या भूमण्डलीकरण भी कहा जा रहा है। सेटेलाइट, संचार माध्यमों की तीव्रता के साथ–साथ ही कम्प्यूटर और इन्टरनेट के आ जाने से हम दुनिया के किसी एक कोने में बैठकर विश्व के किसी भी कोने में हो रही घटनाओं को तत्क्षण और सजीव रूप में देख सकते हैं। विश्व का असीम ज्ञान–भण्डार प्रौद्योगिकीय नवाचारों ने सर्व सुलभ कर दिया है। सूचना प्रौद्योगिकी का क्षेत्र हो या संचार प्रौद्योगिकी का अथवा उपग्रह प्रक्षेपण का, आज का भारत एक महाशक्ति के रूप में उभर रहा है। 20 सितम्बर 2004 को ''एडुसैट'' नामक शिक्षा उपग्रह का सफलतापूर्वक प्रक्षेपण कर हमारे देश ने एक नया कीर्तिमान स्थापित किया है।

इक्कीसवीं सदी और भारत की प्रारम्भिक शिक्षा

14 वर्ष तक के आयुवर्ग के सभी बच्चों को गुणवत्तापूर्ण प्रारम्भिक शिक्षा अनिवार्य रूप से उपलब्ध कराना हमारे लिए संवैधानिक चुनौती है। भारत जैसे विशाल देश में सभी के लिए शिक्षा की व्यवस्था जुटाना सरल भी नहीं है। आज भारत के लगभग 35 लाख शिक्षक 8,96,656 स्कूलों में 16. 92 करोड़ शिक्षार्थियों को प्रारम्भिक स्तरीय शिक्षा देने में संलग्न हैं। फिर भी करोड़ों बच्चे इस अनिवार्य शिक्षा से वंचित हैं, नामांकित छात्रों में से कई विद्यालयी शिक्षा पूरी करने से पहले ही अनेक कारणों से पढ़ाई बीच में ही छोड़ देते हैं और जो पूरी करते हैं उन्हें गुणवत्तापूर्ण शिक्षा मिल नहीं पाती। ऐसे समय में ही नई तकनीकी एवं आविष्कारों विशेषज्ञता का प्रयोग हमारे लिए अत्यन्त कारगर सिद्ध हो सकता है।

सर्व शिक्षा अभियान और ICT की पहल

आज प्रारम्भिक स्तरीय शिक्षा के सार्वभौमीकरण एवं गुणवत्तापरक शिक्षा देने के उद्देश्य से राष्ट्रव्यापी सर्व शिक्षा अभियान चलाया जा रहा है। वास्तव में सर्व शिक्षा अभियान के उद्दश्यों की प्राप्ति के लिए प्रारम्भिक विद्यालयी शिक्षकों की दक्षता के साथ–साथ अभिभावकों की सजगता, अध्यापक शिक्षकों की सक्रियता, शिक्षा पदाधिकारियों की जागरूकता तथा शैक्षिक आयोजकों की तत्परता भी अनिवार्य है। अस्तु प्रारम्भिक स्तर की शिक्षा में गुणात्मक प्रगति के लिए सेवा–पूर्व तथा सेवाकालीन अध्यापक प्रशिक्षण कार्यक्रमों की सुनिश्चितता तो अपेक्षित है ही, साथ ही आवश्यक है कि बदलते परिवेश के अनुसार सेवाकालीन प्रशिक्षण कार्यक्रमों का अद्यतन एवं विकासोन्मुखी हों। इसके लिए शिक्षा समर्पित उपग्रह "एडुसैट" तथा "सूचना संचार प्रौद्योगिकी" की सक्षमता का अधिकाधिक उपयोग सर्वथा प्रासंगिक है।

सर्व शिक्षा अभियान और बिहारः विश्व का प्रथम

लोकतांत्रिक लिच्छवी गणराज्य, प्राचीनतम नालन्दा विश्वविद्यालय का प्रदेश तथा राजनीतिशास्त्र के प्रथम सुप्रसिद्ध लेखक चाणक्य की धरती, खगोल विज्ञानी एवं आविष्कारक आर्यभट्ट की जन्मभूमि, जगज्जननी जानकी की अवतरण की पुण्य भूमि, भगवान महावीर एवं गुरु गोविन्द सिंह की मातृभूमि, भगवान गौतम बुद्ध की ज्ञान–भूमि बिहार आज देश में शिक्षा की दृष्टि से निम्नतम सोपान पर है।

- नौ प्रमण्डल, अड़तीस जिलों, एक सौ एक अनुमण्डलों, पाँच सौ तैंतीस प्रखण्डों, आठ हजार पाँच सौ तीन पंचायतों एवं पैंतालिस हजार एक सौ तीन गाँवों वाला बिहार प्रदेश आज गरीबी एवं निरक्षरता के कारण अभिशप्त है;
- फलस्वरूप दरिद्रता, बेरोजगारी, कुत्सित जाति–धर्म–सम्प्रदायवाद आदि अनेक कुरीतियों के कारण आज यह प्रदेश अपहरण, भ्रष्टाचार, दुराचार, हत्या, लूटपाट आदि से त्रस्त है जिसका प्रमुख कारण शैक्षिक पिछड़ापन एवं विभिन्न कार्यक्रमों का यथोचित कार्यान्वयन नहीं होना है।

अस्तु सर्व शिक्षा अभियान की सुनिश्चित सफलता के लिए ICT की पहल के सन्दर्भ में प्रयुक्त आँकड़े SSA के State Component Plan 2004–05ए जनगणना 2001 एवं SIET के द्वारा प्रायोजित शोध–अध्ययन से लिए गए हैं। इस लेख को दो भागों में विभक्त किया गया है। प्रथम भाग में प्रारम्भिक शिक्षा के सर्वव्यापीकरण के लक्ष्य को प्रदेश स्तर पर पूरा करने के लिए ICT के उपयोग की पहल करने के सम्बन्ध में विचार करने के पूर्व बिहार की वर्तमान शैक्षिक स्थितियों को रखने का प्रयास किया गया है। तथा दूसरे भाग में प्रारम्भिक स्तरीय शिक्षा में गुणात्मक विकास के लिए शिक्षण–अधिगम विज्ञान के संदर्भ में ICT के पहल की आवश्यकता तथा सामग्री निर्माण के क्षेत्र तथा प्रक्रिया एवं उपयोग पर विचार किया गया है।

15.1 बिहार में प्रारम्भिक शिक्षा की स्थिति

प्रारम्भिक शिक्षा

विभिन्न नियमित शिक्षण संस्थाओं में ''प्रारम्भिक शिक्षा'' सम्पूर्ण शिक्षा की आधारशिला है, नींव है। प्रारम्भिक शिक्षा का काल 'बच्चों' में संस्कार निर्माण,चरित्र निर्माण, कौशल, अभिव्यक्ति आदि के स्वाभाविक विकास का काल होता है। आज समाज के प्रत्येक क्षेत्र में आई गिरावट का मूल कारण 'चरित्र ह्रास एवं नैतिकता का पतन है, और चरित्र तथा नैतिकता की बुनियाद है–अच्छी प्रारंभिक शिक्षा।

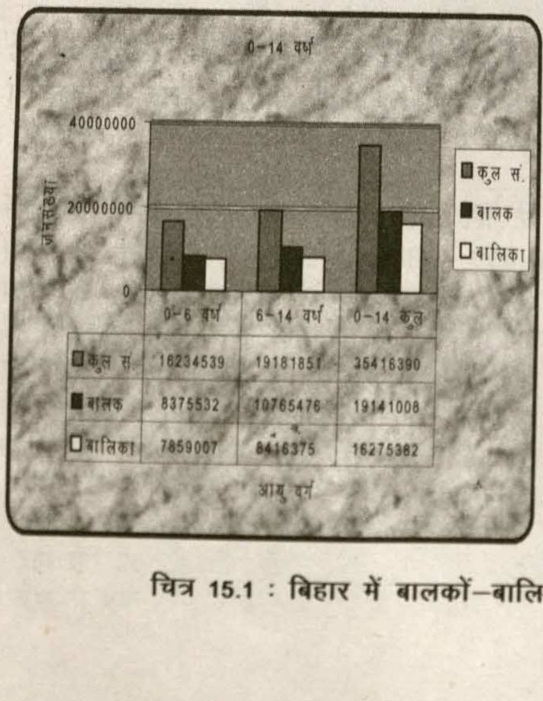
प्रारम्भिक शिक्षा का सर्वव्यापीकरण

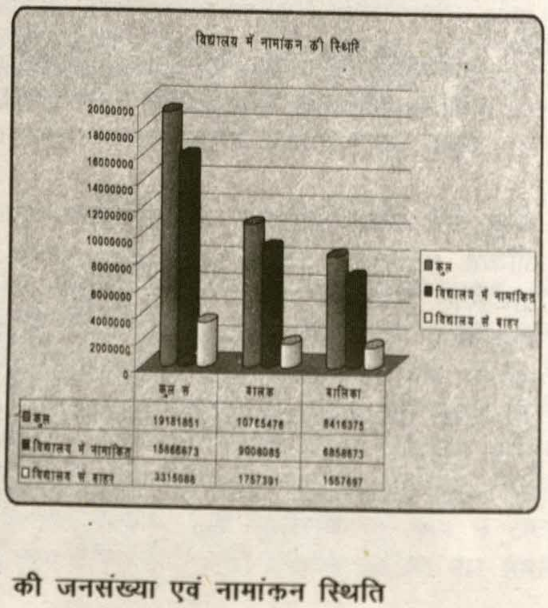
बिहार में प्रारम्भिक शिक्षा के सर्वव्यापीकरण के लिए बिहार शिक्षा परियोजना द्वारा चलाए जा रहे सर्व शिक्षा अभियान के अन्तर्गत शत प्रतिशत नामांकरण, ठहराव ;तमजमदजपवदद्ध एवं पक्की शिक्षा के लिए विद्यालय भवन निर्माण, शिक्षकों की नियुक्ति एवं प्रशिक्षण, उनके सशक्तीकरण, प्रबंधन–दक्षता आदि सभी अनिवार्य पक्षों की दिशा में कई कार्यक्रमों के माध्यम से सकारात्मक प्रयास किए जा रहे हैं ।

राज्य के करोड़ों बच्चों को संविधान सम्मत शिक्षा प्रदान करने हेतु ''मध्याह्न पोषाहार योजना, निःशुल्क पुस्तक वितरण योजना, बाल मेलों का आयोजन, स्कूल शिक्षा समिति की बैठक, संकुल संसाधन केन्द्र,प्रखण्ड संसाधन केन्द्र में कई प्रकार की गतिविधियाँ आदि के कार्यान्वयन में लाखों मानव संसाधन का श्रम एवं करोड़ों रुपये व्यय किए जा रहे हैं। फिर भी अपेक्षित परिणाम नदारद हैं। इस संदर्भ में एक दृष्टि बिहार के शैक्षिक आँकड़ों पर डालना उपयुक्त होगा :

तालिका I: बिहार में 0–14 आयु वर्ग की जनसंख्या एवं नामांकन की स्थिति

बच्चे	कुल संख्या	बालक	बलिकाऐं
6–14 आयु वर्ग	1,91,81,851	1,07,65,476	84,16,375
विद्यालय में नामांकित	1,58,66,673	90,08,085	68,58,673
विद्यालय से बाहर	33,15,088	17,57,391	15,57,697
0–6 आयु वर्ग	1,62,345,39	83,75,532	78,59,007

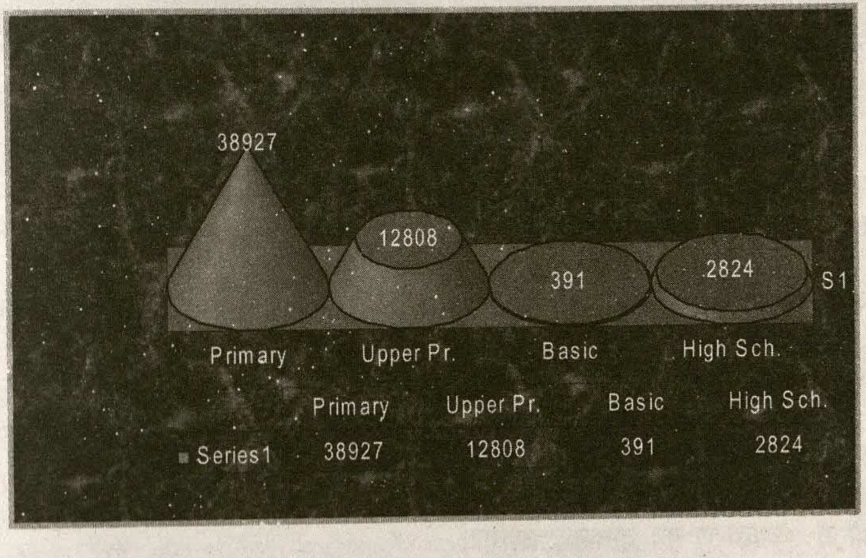




चित्र 15.1 : बिहार में बालकों–बालिकाओं की जनसंख्या एवं नामांकन स्थिति

तालिका 2: बिहार में विद्यमान विद्यालयों की स्थिति

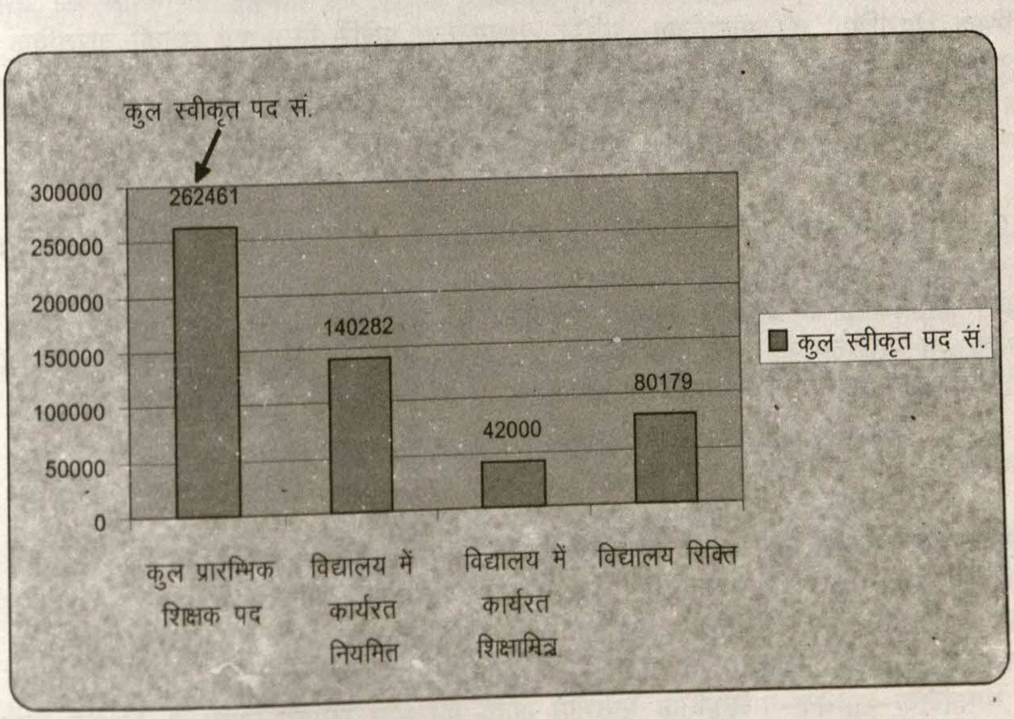
प्राथमिक	माध्यमिक	उच्च माध्यमिक	बी. आर.सी.	सी. आर.सी
38,927	12,808	2,824	533	4,451



चित्र 15.2: बिहार में शिक्षकों की विद्यमान स्थिति

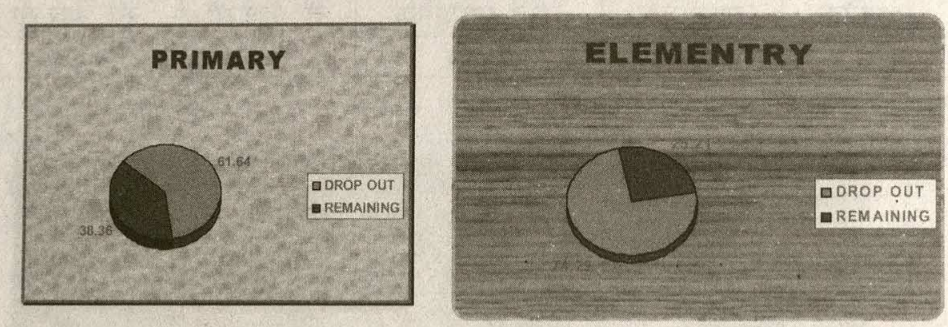
तलिका 3: बिहार – अध्यापकों संबंधी तथ्य

स्वीकृत एवं कार्यरत नियमित शिक्षक				
स्वीकृत पद	कार्यरत	प्रशिक्षित	अप्रशिक्षित	शिक्षामित्र
2,62,461	1,40,282	1,24,683	15,599	42,000 (लगभग)



चित्र 15.3: बिहार के विद्यालयों में सेवारत शिक्षक

बिहार में कुल शिक्षण–प्रशिक्षण संस्थान = 60 (डायट सहित) कुल डायट : 20



चित्र 15.4: बिहार में ड्रॉप–आउट दर 2001–02 (प्रतिशत में): प्रारंभिक तथा मध्य विद्यालय

उपरोक्त आँकड़ों से सर्व शिक्षा अभियान के अन्तर्गत बिहार में प्रारम्भिक शिक्षा की वस्तुस्थिति (नामांकण एवं ठहराव) स्पष्ट है। प्रारम्भिक स्तरीय शिक्षा के गुणात्मक विकास के सन्दर्भ में एससीईआरटी, पटना के अनुसार निम्न प्रमुख चुनौतियाँ उल्लेखनीय हैं–

- विद्यालयों में शिक्षकों की कमी;
- अधिकांश शिक्षकों की अधिक आयु;
- शिक्षकों में विषयवस्तु का कमजोर आधार;
- शिक्षकों में सेवापूर्व प्रशिक्षण की कमजोर नींव;
- शिक्षकों का शिक्षकेतर कार्य में उपयोग;
- संसाधन केन्द्रों का ठीक से विकसित न किया जाना;
- शिक्षक–प्रशिक्षण का आवश्यकता–आधारित नहीं होना; तथा
- शिक्षक नियुक्ति में अवरोध।

आश्चर्य तो यह है कि वास्तविक लक्ष्य–समूह की समस्याओं की ओर ध्यान नहीं देकर अपनी ओर से ज्ञान थोपने का कार्य अभी भी जारी है। अस्तु बिहार की वर्तमान परिस्थिति को देखते हुए प्रारम्भिक शिक्षार्थियों की सामाजिक–आर्थिक–सांस्कृतिक परिस्थितियों एवं उनकी वास्तविक शैक्षिक समस्याओं के आधार पर प्रारम्भिक स्तरीय शिक्षा के गुणात्मक विकास के लिए अनिवार्य शिक्षण–अधिगम सामग्री की आवश्यकताओं की पूर्ति के लिए शिक्षा उपग्रह ''एडुसैट'' एवं सूचना–संचार प्रौद्योगिकी के उपयोग की सम्भावनाओं पर विचार करना आवश्यक है ।

15.2 शिक्षण–अधिगम विज्ञान के आलोक में ICT के पहल की आवश्यकता

शैक्षिक मनोविज्ञान के अनुसार शिक्षक एवं शिक्षार्थी को बिना जाने, बिना समझे, बिना उनकी जरूरतों का पता लगाए उनके लिए किसी प्रकार की अतिरिक्त शिक्षण–सामग्रियों की परिकल्पना, निर्माण एवं उनके उपयोग से उनकी सार्थकता पर एक प्रश्न चिह्न खड़ा होता है।

शिक्षार्थी–केन्द्रित शिक्षण

शिक्षण प्रत्यक्ष हो अथवा परोक्ष, प्रारम्भिक शिक्षा क्षेत्र में कक्षा–शिक्षण में जरूड शिक्षण सामग्री की बात हो अथवा उनके लिए मुद्रित सामग्री, चित्र सामग्री, चार्ट,पोस्टर की अथवा किन्ही गतिविधियों की। इसकी तैयारी शुरू होती है–लक्ष्य समूह की आवश्यकता का पता लगाने से। लक्ष्य समूह की शैक्षिक आवश्यकताओं को जानने के क्रम में उनका वर्तमान उपलब्धि स्तर, कठिन पाठ्य बिन्दु,सामाजिक–आर्थिक–सांस्कृतिक पृष्ठभूमि आदि का पता लगाना जाता है, जिससे उनके लिए प्रभावी उपचारात्मक शिक्षण हेतु उपयुक्त कार्य योजना बनाई जा सके।

शिक्षण–सामग्री निर्माण की प्रक्रिया के चरण

शिक्षक–शिक्षार्थियों के लिए शिक्षण–सामग्री निर्माण की प्रक्रिया में निम्न चरण आवश्यक बताए गए है–

- लक्ष्य समूह का ज्ञान (Know your target group i.e. learners)
- आवश्यकताओं का आकलन एवं शीर्षक चयन (Need Assessment & Topic Identification)
- माध्यम चयन (Media Selection)
- कार्यक्रम की संरचना (Programme Structure)
- विषय सामग्री सम्बन्धी शोध (Content Research)
- पटकथा/आलेख लेखन, जाँच एवं संशोधन (Script Writing, testing and correction)
- पटकथा अनुमोदन (Script Approval)
- सामग्री निर्माण (Production)
- सामग्री मूल्यांकन (Product Evaluation)
- उपयोग एवं फीड बैक (Use & Feedback)
- पुनर्चिन्तन (Re- thinking)

अस्तु शिक्षक–शिक्षार्थियों की शैक्षिक समस्याओं का पता लगा कर ICT अथवा अन्य सहायक शिक्षण–अधिगम सामग्री आदि के निर्माण के लिए किए गए अध्ययनों पर प्रकाश डालना समीचीन प्रतीत होता है।

शोध अध्ययन के उद्देश्य

इस शोध अध्ययन के प्रमुख उद्देश्य निम्न थे–

- प्रारम्भिक शिक्षक– शिक्षार्थियों की **शैक्षिक समस्याओं का पता लगाना।**
- प्रारम्भिक कक्षा की पाठ्य पुस्तकों से **कठिन बिन्दुओं का चयन।**
- **प्रारम्भिक शिक्षक एवं शिक्षार्थियों के लिए** audio-video,chart, games, activities, model अथवा अन्य सामग्री के निर्माण के लिए सूचीबद्ध करना।

शोध अध्ययन का क्षेत्र

अध्ययन के लिए न्यादर्श के तौर पर बिहार के दो जिलों का चयन किया गया–उत्तरी बिहार में दरभंगा तथा झारखण्ड में पूर्वी सिंहभूम। इन जिलों के शहरी, अर्द्धशहरी एवं ग्रामीण क्षेत्र के शिक्षक–शिक्षार्थियों का चयन किया गया, तथा उनसे संबंधित तथ्यों को एकत्रित किया गया।

शोध उपकरणः इस अध्ययन में निम्नलिखित उपकरणों का प्रयोग किया गया

- अवलोकन एवं पर्यवेक्षण
- प्रश्नावली
- समूह–चर्चा
- साक्षात्कार एवं बातचीत
- कार्यशाला

शोध प्रक्रिया

सर्वप्रथम प्रारम्भिक कक्षाओं की विविध **पाठ्य पुस्तकों का अध्ययन एवं विश्लेषण** किया गया। शोध के क्रम में शिक्षण–अधिगम सामग्री निर्माणार्थ कठिन बिन्दुओं के चयन के साथ ही लक्ष्य समूह की विशेषताओं का भी यथासम्भव अध्ययन किया गया ।

सामाजिक स्थिति: दोनों जिलों के लगभग 700 शिक्षार्थियों पर अध्ययन करने पर ज्ञात हुआ कि दोनों जिलों के शहरी एवं ग्रामीण क्षेत्रों की कुछ स्थिति लगभग एक जैसी है, यथाः– शहरी क्षेत्र के अधिकांश विद्यालयों में आर्थिक दृष्टि से निम्न वर्ग के बच्चे पढ़ते हैं वहीं कुछ ऐसे भी विद्यालय हैं जहाँ शहर के सभी वर्ग के बच्चे पढ़ते हैं । ऐसे विद्यालयों का एक समृद्ध अतीत रहा है । ऐसे विद्यालयों में पढाई अच्छी होने की मान्यता रही है । ग्रामीण क्षेत्र के विद्यालयों में सामान्यतः सभी प्रकार की सामाजिक–आर्थिक पृष्ठभूमि के बच्चे पढ़ते हैं । जिन कुछ ग्रामीण क्षेत्रों में पब्लिक स्कूल खुल गये हैं वहाँ के सरकारी विद्यालयों में मात्र आर्थिक दृष्टि से विपन्न बच्चे पढ़ते हैं ।

सांस्कृतिक स्थिति: दोनों जिलों की सांस्कृतिक स्थिति बिल्कुल अलग है। दरभंगा में मिथिलांचल की संस्कृति है और पूर्वी सिंहभूम में छोटानागपुर की संस्कृति के साथ ही बंगाल एवं उड़ीसा के सीमावर्त्ती क्षेत्रों के कारण मिली–जुली संस्कृति है। पूर्वी सिंहभूम के ऐसे ग्रामीण क्षेत्र में सबसे बड़ी विडम्बना है कि यह 75 प्रतिशत विद्यालयों के शिक्षक अपने छात्रों की भाषा समझ नहीं पाते।

सामान्य समस्या: दोनों ही जिलों में सरकारी विद्यालयों के शिक्षार्थियों को कुछ सामान्य समस्याऐं झेलनी पड़ रही हैं यथाः– गरीबी, निरक्षरता, बाल श्रमिक, लिंग भेद विषमता, अंधविश्वास, अविकसित जीवनशैली ....।

शैक्षिक स्थिति:

क) प्राथमिक कक्षा दोनों ज़िलों के प्राथमिक विद्यालयों में शिक्षार्थियों पर किए गए अध्ययन से चार मूल दक्षताओं में सुनने के अतिरिक्त शेष में अनेक कठिनाइयाँ हैं। हिन्दी लेखन में सुलेख एवं वर्तनी की शुद्धता का पर्याप्त अभाव देखा गया। चित्रांकन को एक महत्वहीन विषय समझकर उपेक्षित कर दिया गया है। समाज विज्ञान की पाठ्यपुस्तक को दुरूह एवं अवैज्ञानिक पाया गया। हिन्दी में मात्र 12 प्रतिशत् शिक्षार्थियों की अच्छी लिखावट है। छात्रों की अपेक्षा छात्राओं की लिखावट अच्छी देखी गई। वर्तनी सम्बन्धी अशुद्धि लिखने वाले छात्र का 67 प्रतिशत् हैं। यह शहरी एवं ग्रामीण क्षेत्र के विद्यालयों का समेकित अध्ययन है। इसी प्रकार हिन्दी बोलने या पढ़ने में आंचलिकता के कारण व–ब, र–ड़, न–ण, य–ज आदि सम्बन्धी अशुद्धि आम समस्या है। पाँचवीं कक्षा के छात्रों की प्रत्येक विषय में उपलब्धि का अध्ययन करने पर ज्ञात हुआ कि मध्य विद्यालय में पढनेवाले पाँचवीं कक्षा के शिक्षार्थियों की उपलब्धि प्राथमिक विद्यालय में पाँचवीं कक्षा में पढनेवाले शिक्षार्थियों की उपलब्धि से कहीं अधिक है।

ख) उच्च प्राथमिक कक्षाऐं: बिहार में कक्षा 6–8 की पढ़ाई दो प्रकार के विद्यालयों में होती है– मध्य विद्यालयों एवं उच्च विद्यालयों में। प्राथमिक विद्यालयों से 5वीं कक्षा उत्तीर्ण कर मध्य विद्यालय में कक्षा 6–8 तक अध्ययन करनेवाले छात्रों की अपेक्षा मध्य विद्यालय में प्रारम्भ से पढ़नेवालों छात्रों की उपलब्धि अधिक है। प्रत्येक विषय में कक्षावार एवं विद्यालयवार शिक्षार्थियों का स्तर अलग–अलग है। पाठ्यपुस्तकों में कई कमियाँ हैं। छात्रों को इस स्तर पर अतिरिक्त शिक्षण–अधिगम सामग्री की अत्यन्त आवश्यकता तो है ही, शिक्षकों को भी इसका प्रयोजन है।

15.3 प्रारम्भिक विद्यालयों में TLM की स्थिति

बिहार में विगत वर्षों में शिक्षकों को 'उजाला–1' एवं 'उजाला–2' के नाम से दिए गए सेवाकालीन प्रशिक्षण के दौरान प्रत्येक शिक्षक को 1000.00 रु. टी. एल. एम. निर्माण के लिए दिए गए जिससे

कक्षा शिक्षण में सजीवता लाने के साथ–साथ शिक्षार्थियों को विविध गतिविधियों पर आधारित अधिगम के अवसर प्राप्त हो सकें। प्रतिवर्ष बाल मेला या अन्य कार्यक्रमों के माध्यम से शिक्षण–अधिगम सामग्रियों का प्रदर्शन, प्रतियोगिता तथा पुरस्कार वितरण का आयोजन भी किया जाता रहा है। फिर भी बिहार के प्राथमिक एवं मध्य विद्यालयों में टीएलएम की उपलब्धता नगण्य एवं उनका उपयोग निराशाजनक है जो तालिका 4 से स्पष्ट है–

तालिका 4: टी.एल.एम. की उपलब्धता की स्थिति

टीएलएम → विद्यालय ↓	आनन्दशाला के अतिरिक्त अधिकतम 10 शि. अ. सा.	10 से 20 के बीच शि. अ. सा.	20 से अधिक शि. अ. सा.
प्राथमिक	09 प्रतिशत	04 प्रतिशत	0.03
उपयोग	शून्यवत	नगण्य	बिन्दुवत
मध्य	16 प्रतिशत	08 प्रतिशत	0.05
उपयोग	यदाकदा	केवल विशेष अवसरों पर	2–3 प्रतिशत

उक्त आँकड़ों का संकलन लेखक द्वारा स्वयं बिहार के पटना, वैशाली, दरभंगा, मधुबनी, सीतामढ़ी, सीवान एवं नालन्दा जिलों में कुल तीस विद्यालयों में किए गए पर्यवेक्षण के दौरान किया गया है। प्रायः विद्यालयों में टीएलएम उपलब्ध ही नहीं थे; जिन विद्यालयों में कुछ चार्ट–पोस्टर्स देखे गए, वहाँ के शिक्षार्थियों के अनुसार इनका उपयोग में शिक्षण–अधिगम के लिए कभी नही किया गया। कुछ ऐसे शिक्षकों से भी बात की गई जिन्हें टी. एल. एम निर्माण के लिए प्रखण्ड स्तरीय/जिला स्तरीय प्रतियोगिता में प्रथम या द्वितीय पुरस्कार मिला था, परन्तु वे भी इनका उपयोग केवल इसी प्रकार के अवसरों पर ही करते हैं। भ्रमण किए गए विद्यालयों में सीवान जिले में केवल एक शिक्षक ही ऐसे थे जो इनका कक्षा शिक्षण में भरपूर उपयोग करते हैं।

इस प्रकार यह कहना बिल्कुल सही होगा कि सेवाकालीन प्रशिक्षण के उपरान्त प्राप्त राशि का उपयोग बिल्कुल ही नहीं हुआ। यदि कुछ अध्यापकों ने बाजार से कुछ खरीदा भी है तो वे इसे घर पर ही रखते हैं। कुछ विद्यालयों में बाल पुस्तकालय के लिए जो किताबें दी गई उनमें "मोटापा कैसे घटाएँ" जैसी पुस्तकें ही अधिक देखने को मिली। प्राथमिक कक्षाओं के लिए बनाए गई आनन्दशाला में दीवार पर चित्रित एवं लिखित सामग्रियों का सर्वाधिक उपयोग हो रहा है। जिन विद्यालयों में दीवार पर आप्त बचन लिखे थे उनमें कई भाषागत, वर्तनीगत एवं विषयगत त्रुटियाँ भी पाई गई। इस प्रकार बिहार के प्रारम्भिक स्तरीय शिक्षा में शिक्षण–अधिगम सामग्री की स्थिति चिन्तनीय है। अस्तु आवश्यकता इस बात की है कि शिक्षकों को भ्रान्ति रहित, सुसंगत, अधुनातन एवं गुणवत्तापूर्ण TLM उपलब्ध कराए जाएं जिसके लिए ICT का उपयोग सर्वथा प्रासंगिक है जो अब "एडुसैट" के कारण और अधिक सर्व सुलभ हो सकेगा।

15.4 बिहार में ICT के अन्तर्गत कार्यक्रम निर्माण एवं उपयोग

अब सर्व शिक्षा अभियान के परिप्रेक्ष्य में बिहार के प्रारम्भिक विद्यालयों में आईसीटी के उपयोग की सम्भावनाओं पर विचार करना समीचीन होगा।

ICT योजना के कार्यान्वयन से अभिप्राय है: सूचना–संचार प्रौद्योगिकी के अन्तर्गत कम्प्यूटर–सहायक शिक्षण–अधिगम सामग्री यथा सीडी–रोम,डीवीडी ,मल्टीमीडिया सीडी, सॉफ्टवेयर, कोर्सवेयर आदि के साथ–साथ वेब/इन्टरनेट आधारित शिक्षा की उपलब्धता एवं वास्तविक लाभार्थियों तक इन सामग्रियों को पहुँचाना । बिहार जैसे प्रदेश के लिए यह एक असाधारण कार्य है। लेखक ने ऐसे भी

विद्यालय देखे हैं जहाँ सरकार की ओर से 10 कम्प्यूटर के साथ इसके सुसंधारण–सुसंचालन के लिए जेनरेटर भी दिए गए है, परन्तु स्थिति यह है कि इनका कोई भी उपयोग नहीं हो रहा। इग्नू (IGNOU) के द्वारा "ज्ञानदर्शन" चैनल देखने की सुविधा बिहार में जहाँ–जहाँ उपलब्ध कराई गई है उनमें अपवाद को छोड़कर कहीं भी इसका सुचारु रूप से संचालन नहीं होता। ऐसी स्थिति में इस सन्दर्भ में एक व्यापक चिन्तन अपेक्षित है। बिहार में प्रारम्भिक स्तरीय शिक्षा के गुणात्मक विकास के लिए आवश्यकतापरक आई. सी. टी आधारित शिक्षण–अधिगम सामग्रियों का निर्माण तथा इनका अधिकाधिक उपयोग करने के लिए निम्न सुझाव विचारणीय माने जा सकते है :

आईसीटी आधारित सामग्री निर्माण

आवश्यकतापरक सामग्री निर्माण हेतु अपेक्षित शोध एवं शीर्षक चयनः प्रारम्भिक अध्यापकों के अध्यापन कौशल के विकास, प्रभावी कक्षा–शिक्षण तकनीक, शिक्षण–अधिगम हेतु उपयुक्त विद्यालय पर्यावरण, अभिभावकों सहित समुदाय की सक्रिय सहभागिता, शिक्षा पदाधिकारियों का शैक्षिक क्रियाकलापों के साथ सकारात्मक तारतम्य, दक्ष, प्रतिबद्ध एवं कर्मठ शिक्षकों की पहचान तथा समुचित अभिप्रेरण के क्षेत्र में आईसीटी आधारित सामग्री निर्माण हेतु एक स्वस्थ एवं सतत अनुसन्धान आवश्यक है, जो जिला स्तरीय सक्षम अध्यापकों, डायट के अनुभवी प्राध्यापकों एवं समर्पित शिक्षाविदों की एक सुनिश्चित टीम द्वारा किया जा सकता है। इसका दायित्व SIET के अकादमिक प्रभाग को देने पर विचार किया जा सकता है।

सामग्री–निर्माण की रूपरेखा हेतु दलों का गठनः शीर्षक चयन के बाद गुणवत्तापूर्ण विषय/कक्षावार सामग्री–निर्माण की रूप–रेखा तैयार करने के लिए राज्यस्तरीय दल का गठन किया जाए जिसमें एस. आई. ई. टी., एस. सी. ई. आर. टी., डायट, तथा सर्वशिक्षा अभियान से जुड़े अकादमिक सदस्यों की विशेषज्ञता का उपयोग आवश्यक होगा।

इस समूह द्वारा चयनित शीर्षकों पर सामग्री निर्माण की रूपरेखा तैयार की जाएगी।

सामग्री निर्माण हेतु कोर–ग्रुप

- पाठ्यवस्तु समन्वयक (अकादमिक ग्रुप)
- श्रव्य–दृश्य समन्वयक (प्रोड्यूसर ग्रुप)
- ग्रफिक्स समन्वयक (ग्राफिक्स ग्रुप)
- मल्टीमीडिया विशेषज्ञ
- तकनीकी समन्वयक (अभियंत्रण ग्रुप)

→

कार्य योजना निर्माण
लक्ष्य निर्धारण
कार्यान्वयन योजना
समीक्षा एवं विश्लेषण

सामग्री निर्माण हेतु विशेषज्ञों का दलः सामग्री की रूपरेखा तैयार करने के बाद तकनीकी विशेषज्ञों के गठित दल द्वारा आईसीटी आधारित सामग्री (मल्टीमीडिया सीडी, सॉफ्टवेयर, कोर्सवेयर आदि) का निर्माण किया जा सकता है। इस दल में अकादमिक सदस्यों के अलावा ऑडियों–वीडियो ग्रुप, ग्राफिक्स,कम्प्यूटर डिजायनर, प्रोग्रामर आदि होंगे।

सामग्रियों का मूल्यांकन एवं गुणवत्ता की जाँचः तैयार की गई सामग्रियों को निर्धारित गठित दल द्वारा विषयवस्तु की प्रामाणिकता एवं प्रासंगिकता, तकनीकी रूप से उत्तमता का मूल्यांकन एवं वास्तविक लक्ष्य–समूह पर इसके प्रभावों की जाँच की जाए तथा आवश्यक संशोधन/परिमार्जन के बाद इसके उपयोग की स्वीकृति दी जा सकती है।

सतत अनुश्रवण एवं फीड बैकः प्रारम्भिक शिक्षा में उत्तरोत्तर गुणात्मक विकास के लिए उपयोग की जा रही सामग्रियों का प्रभाव एवं उनमें सतत सुधार हेतु एक स्वतंत्र दल द्वारा समुचित अनुश्रवण कर फीडबैक उपलब्ध कराना परमावश्यक होगा।

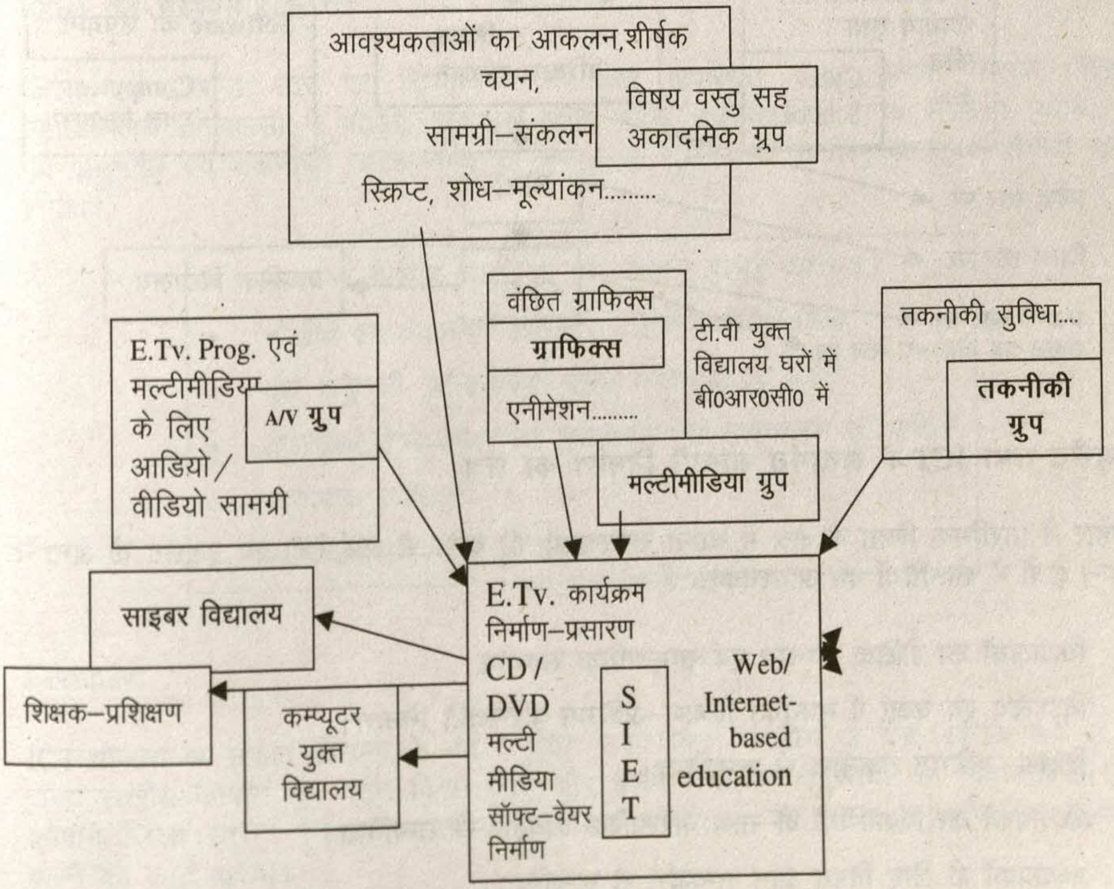
आईसीटी आधारित सामग्रियों का उपयोग

समुचित संसाधन की उपलब्धता एवं सुसंचालन की चुनौतियाँ: उपरिवर्णित निर्मित सामग्रियों के उपयोग के लिए अनिवार्य संसाधनों की उपलब्धता, सुसंधारण तथा सुसंचालन प्रमुख चुनौतियाँ हैं। किसी भी योजना के कार्यान्वयन की सफलता उस प्रदेश की सामाजिक–राजनीतिक–प्रशासनिक परिस्थितियों पर निर्भर करती है और बिहार की स्थिति किसी से छिपी नहीं है। प्रदेश के डायट एवं अध्यापक प्रशिक्षण संस्थान मृतप्राय हैं। अस्तु योजना कार्यान्वयन के पूर्व इनके भौतिक तथा मानव संसाधनों की व्यवस्था भी अपरिहार्य है।

यथोचित मानव संसाधन के चयन में सतर्कता: किसी भी योजना के सफल कार्यान्वयन में एक और प्रमुख कारक होता है– योजना में संलग्न यथोचित मानव संसाधनों का चयन अर्थात दक्ष, प्रतिबद्ध एवं कर्मठ सदस्यों का चयन। लेखक के अनुभव के अनुसार बिहार में सामान्यतः इस तरह के चयन में भी जाति, भाई–भतीजावाद, घूस, पैरवी आदि को प्रमुख आधार मानना एक परम्परा सा बन गया है। अस्तु इसमें सतर्कता आवश्यक है अन्यथा योजना की संदिग्धता ही नहीं असफलता सुनिश्चित है।

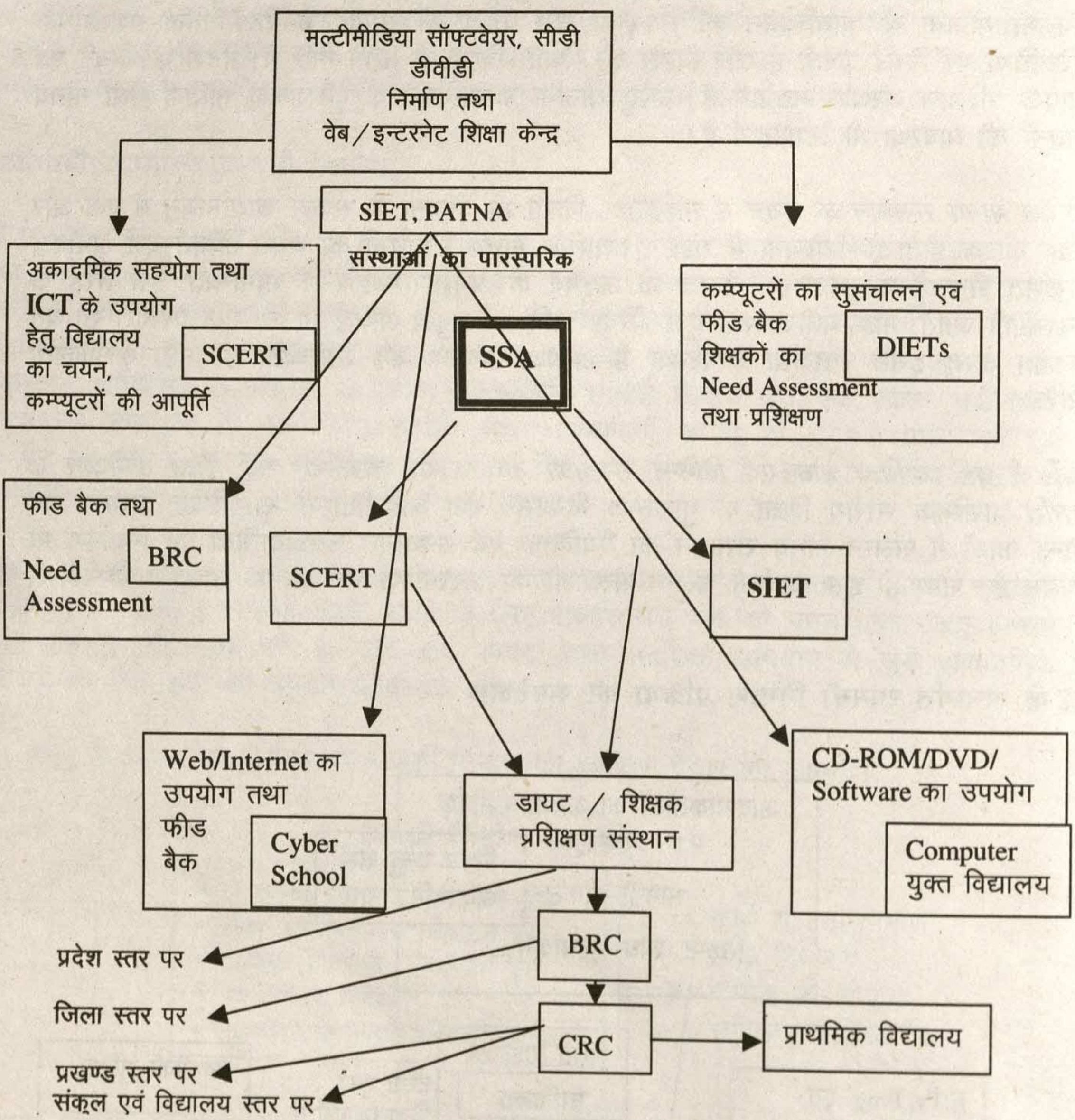
कार्यों के प्रति दायित्व बोध एवं बिभिन्न संस्थाओं का परस्पर तारतम्य: सर्व शिक्षा अभियान के अन्तर्गत प्रारम्भिक स्तरीय शिक्षा के गुणात्मक विकास हेतु आईसीटी के सुनिश्चित उपयोग हेतु बिभिन्न कार्यों में संलग्न मानव संसाधन का वैयक्तिक एवं संस्थागत उत्तरदायित्व का निर्धारण भी अनिवार्य है। साथ ही इस कार्य में संलग्न संस्थाओं का पारस्परिक सकारात्मक तारतम्य भी जरूरी है।

ICT के अन्तर्गत सामग्री निर्माण प्रक्रिया की रूपरेखा


आवश्यकताओं का आकलन,शीर्षक चयन,
सामग्री–संकलन
स्क्रिप्ट, शोध–मूल्यांकन.........
विषय वस्तु सह अकादमिक ग्रूप
वंछित ग्राफिक्स
ग्राफिक्स
एनीमेशन.........
टी.वी युक्त विद्यालय घरों में बी0आर0सी0 में
तकनीकी सुविधा....
तकनीकी ग्रुप
E.Tv. Prog. एवं मल्टीमीडिया के लिए आडियो / वीडियो सामग्री
A/V ग्रुप
मल्टीमीडिया ग्रुप
E.Tv. कार्यक्रम निर्माण–प्रसारण
CD / DVD
मल्टी मीडिया सॉफ्ट–वेयर निर्माण
S I E T
Web/ Internet-based education
साइबर विद्यालय
शिक्षक–प्रशिक्षण
कम्प्यूटर युक्त विद्यालय

बिहार के प्रारम्भिक स्तरीय शिक्षा के गुणात्मक विकास हेतु

ICT के उपयोग संबंधी एक सुझावपरक प्रारूप


मल्टीमीडिया सॉफ्टवेयर, सीडी डीवीडी निर्माण तथा वेब/इन्टरनेट शिक्षा केन्द्र
SIET, PATNA
संस्थाओं का पारस्परिक
अकादमिक सहयोग तथा ICT के उपयोग हेतु विद्यालय का चयन, कम्प्यूटरों की आपूर्ति
SCERT
SSA
कम्प्यूटरों का सुसंचालन एवं फीड बैक शिक्षकों का Need Assessment तथा प्रशिक्षण
DIETs
फीड बैक तथा Need Assessment
BRC
SCERT
SIET
Web/Internet का उपयोग तथा फीड बैक
Cyber School
डायट / शिक्षक प्रशिक्षण संस्थान
CD-ROM/DVD/ Software का उपयोग
Computer युक्त विद्यालय
BRC
CRC
प्राथमिक विद्यालय
प्रदेश स्तर पर
जिला स्तर पर
प्रखण्ड स्तर पर
संकुल एवं विद्यालय स्तर पर

एडुसैट तथा ICT के अन्तर्गत सामग्री निर्माण का क्षेत्र

बिहार में प्रारम्भिक शिक्षा के क्षेत्र में व्याप्त समस्याओं की दृष्टि से आईसीटी एवं एडुसैट के अन्तर्गत निम्न क्षेत्रों में सामग्रियों की आवश्यकता है–

- विद्यालयों का शैक्षिक प्रबन्धन एवं सामुदायिक सहयोग।
- विद्यालय एवं कक्षा में उपयुक्त शिक्षण–अधिगम परिस्थिति निर्माण।
- शिक्षण–अधिगम तकनीक से सम्बन्धित।
- अध्यापकों का शिक्षार्थियों के साथ पारस्परिक व्यवहार से सम्बन्धित।
- अध्यापकों के लिए विषय ज्ञान सम्वर्द्धन से सम्बन्धित।

- प्रेरणादायी अध्यापकों का पता लगाना एवं उनका सम्मान।
- नवाचारी अध्यापन पद्धति से सम्बन्धित।
- शैक्षिक पदाधिकारियों की तत्परता हेतु।
- सतत मूल्यांकन से सम्बन्धित।
- अनुश्रवण एवं पर्यवेक्षण से सम्बन्धित।
- विभिन्न क्षेत्रों में उल्लेखनीय उपलब्धि वाले विद्यालय, अध्यापक, समुदाय, पदाधिकारी आदि की पहचान कर उन्हें विभिन्न संचार माध्यमों से परिचित करना जिससे वे अन्य के लिए विश्वसनीय उदाहरण एवं प्रेरक सिद्ध हो सकें।

15.5 बिहार में ICT के क्रियान्वयन में कठिनाइयाँ एवं निराकरण

बिहार में प्रारम्भिक शिक्षा क्षेत्र में गुणवत्तावृद्धि के लिए उनके क्रियान्वयन में कई प्रकार की कठिनाइयाँ उपस्थित हो सकती हैं, यथा–

राज्य स्तर पर

ICT के क्रियान्वयन के लिए बननेवाली योजनाओं एवं क्रियान्वयन में प्रदेश की विभिन्न संस्थाओं की विशेषज्ञता की आवश्यकता है । बिहार के परिप्रेक्ष्य में इसके लिए एसआईईटी, एससीईआरटी, बीईपी, स्पीड के विशेषज्ञों सहित प्रदेश के प्राथमिक, माध्यमिक विभाग का पूर्ण सहयोग अपेक्षित है। वर्तमान समय तक ऐसी स्थिति नहीं बन पाई है। इसके लिए भी स्पष्ट निर्देश एवं कार्य दायित्व तय करना अपेक्षित होगा ।

जिला एवं प्रखण्ड स्तर पर

जिला एवं प्रखण्ड स्तर पर क्रियान्वयन के लिए अवस्थित डायट अथवा शिक्षक प्रशिक्षण महाविद्यालय/बीआरसी में भौतिक संसाधन (भूमि, भवन, उपस्करादि), मानव संसाधन (योग्य, दक्ष एवं अनुभवी) एवं तकनीकी उपकरणादि के सुसंधारण–सुसंचालन के लिए आवश्यक तैयारी करनी होगी।

- *प्रदेश से प्रखण्ड स्तर तक एक स्वतंत्र इकाई का गठन*
- *भौतिक एवं तकनीकी संसाधन सहित यथोचित वित्त*
- *दक्ष, अनुभवी एवं प्रतिबद्ध मानव संसाधनों का चयन*
- *तकनीकी उपकरणादि के सुसंधारण एवं सुसंचालन की प्रविधि*
- *आवश्यक प्रशिक्षण*
- *सतत अनुश्रवण एवं मूल्यांकन*

निराकरण

ICT योजना के सफल क्रियान्वयन एवं समुचित सकारात्मक उपयोग के लिए स्वतंत्र रूप से एक राज्य स्तरीय कोषांग का गठन किया जाए और इसमें यथोचित व्यक्तियों का नियोजन हो। यह कोषांग जिला स्तरीय एवं प्रखण्डस्तरीय क्रियान्वित योजनाओं का सतत अनुश्रवण एवं मूल्यांकन करने का कार्य करेगा।

ICT आधारित यथोचित सामग्री–निर्माण एवं उपयोग हेतु नीति–निर्धारकों, क्रियान्वयन कर्त्ताओं, शिक्षाविद्‌ों, मनोविज्ञानियों, शोधकर्त्ताओं की प्रमुख चुनौतियाँ

- नीति व्यवहारमूलक कैसे हो?
- नीतियों का यथोचित क्रियान्वयन कैसे हो?
- क्रियान्वयन का सतत अनुश्रवण कैसे हो?
- अनुश्रवण अथवा क्रियात्मक शोध–अध्ययन सार्थक कैसे हो?
- शिक्षण–अधिगम सामग्री शोध–आधारित और गुणवत्तापरक कैसे हो?
- शिक्षक–शिक्षार्थियों की मनोवैज्ञानिक समस्याओं का निदान कैसे हो?
- योग्य, दक्ष, प्रतिबद्ध मानव संसाधन का चयन कैसे हो?
- उपलब्ध मानव संसाधन का सदुपयोग कैसे हो?

CHAPTER 16

शिक्षण व अधिगम में सूचना संम्प्रेषण तकनीकी का प्रभाव

विनोद कुमार गुप्ता

Abstract

This paper analyses the successful story of Madhya Pradesh's coveted Project for Computer-Assisted Learning (CAL) popularly known as 'Headstart'. The Headstart was used to provide in-service teacher education programme in the state through 2718 Jan Siksha Kendras in all districts of the state. The programme was initiated as an 'innovative educational practice on pilot basis in 648 Jan Shiksha Kendras in 39 districts on November 14, 2000. The programme aims at improving the quality of elementary education of teacher's professional competency as well as of students. The thrust of the programme is on 'self-learning', evaluation and feedback, additional support through CAL alongwith textual material and computer-literacy to school teachers. It encourages good practices of pedagogy viz- problem. solving, self-learning and enquiry method. Forty-eight programmes in various curricular areas based upon hardspots were developed and tried in classrooms. This is a case study of Saliwara Jan Shiksha Kendra of Jabalpur district. The study reveals that this programme has been found effective in increasing enrolment of children, students' level of achievement, improvement in professional competency of school teachers, enhanced status of Jan Shiksha Kendras and attitude of the community towards these Jan Shiksha Kendras. Headstart has thus brought Jan Shiksha Kendras and community closer to one another. The success story of the `Headstart' will facilitate the process of wider reach of and access to schooling in interior villages and habitations which lack regular primary schools.

16.0 पृष्ठभूमि

आज सम्पूर्ण विश्व ज्ञान के हर क्षेत्र मे अत्यंत तेजी से प्रगति की ओर अग्रसर हो रहा है। जीवन के हर क्षेत्र मे प्रायः नयी खोज के समाचार सुनने को मिलते है। ये सूचनायें व्यवस्थित रूप से क्रमशः प्राप्त ना हों तो उनकी उपयोगिता लगभग नहीं के बराबर रह जाती है । सूचना तकनीकी विभिन्न सूचनाओं को व्यवस्थित रूप से प्राप्त करने, उनके संकलन, विश्लेषण व पुनः प्राप्ति करने की एक प्रभावी तकनीकी है। कम्प्यूटर के माध्यम से जब ये सारे कार्य सम्पन्न किये जायें तो यह अध्ययन सूचना तकनीकी कहलाती है।

सूचनाओं को एक स्थान से दूसरे स्थान तक पहुंचाने हेतु उपयोग मे लायी जाने वाली विभिन्न तकनीकों का अध्ययन संप्रेषण तकनीकी है। टेलीफोन, दूरदर्शन, इन्टरनेट, सेटेलाइट इस तकनीकी के अच्छे उदाहरण है, संप्रेषण तकनीकी के बिना सूचना तकनीकी अधूरी है एवं इसका प्रभावी उपयोग नही किया जा सकता। ये दोनो एक दूसरे के पूरक है। इसीलिये सूचना संप्रेषण तकनीकी का उपयोग करने का सशक्त साधन कम्प्यूटर है जिसे मध्यप्रदेश में हेडस्टार्ट कार्यक्रम के माध्यम से विद्यालयों तक पहुंचाया गया है।

शिक्षा के क्षेंत्र मे सूचना व संप्रेषण तकनीकी का महत्व सर्वाधिक है, क्योंकि यह वह क्षेत्र है जहां सबसे अधिक सूचनाओं का आदान–प्रदान होता है। एक शिक्षक अपने विद्यार्थियों के साथ दिनभर सूचनाओं का आदान प्रदान करवाता है। यह सम्प्रेषण जितना अधिक प्रभावी होगा अधिगम भी उतना ही प्रभावी होगा। शिक्षा में सूचना–संप्रेषण तकनीकी सूचनाओं को प्रदान करने की एक व्यवस्थित एवं वैज्ञानिक विधि सूचना संप्रेषण तकनीकी है।

16.1 हेडस्टार्ट कार्यक्रम

सूचना संप्रेषण तकनीकी का प्रयोग करते हुए प्राथमिक शिक्षा में गुणात्मक सुधार हेतु हेडस्टार्ट कार्यक्रम मध्यप्रदेश शासन की अनूठी पहल हैं। इस प्रदेश के ग्रामीण एवं शहरी क्षेत्रों मे सूचना और प्रौद्योगिकी के ज्ञान के अंतर को हेडस्टार्ट समाप्त कर शैक्षणिक संसाधनों में वृद्धि करता है। हेडस्टार्ट कार्यक्रम के द्वारा विद्यार्थियों में सीखने की ऐसी परिस्थितियों का निर्माण किया जाता है जिससे विद्यार्थियों में स्वयं एवं समूह में मिलजुलकर सीखने की प्रवृत्ति का विकास हो, जिससे अधिगम प्रभावी व स्थायी हो सके। इस कार्यक्रम के द्वारा विद्यार्थियों को न केवल समान्य जानकारी व उपयोग बताते हुए उन्हें अन्य क्षेत्रों मे हो रही प्रगति व तकनीकी विकास की मुख्यधारा से जोड़ने का प्रयास किया गया है अपितु इस कार्यक्रम द्वारा पढाये गये पाठों को विद्यार्थियों को कम्प्यूटर पर एवं कम्प्यूटर पश्चात् कार्य करने व परस्पर अंतःक्रिया के अवसर प्रदान किये जाते है जिससे विद्यार्थी अपने परिचित परिवेश में अध्ययन कर सकें।

शिक्षा की गुणवत्ता में वृद्धि

हेडस्टार्ट कार्यक्रम से विद्यार्थियों की शिक्षा की गुणवत्ता वृद्धि के साथ शिक्षकों की कठिन अवधारणाओं को सरल व स्पष्ट करने एवं रोचक गतिविधिओं द्वारा विषयवस्तु को समझाने में सहायक शिक्षण सामग्री के रूप में दिया गया है। हेडस्टार्ट कार्यक्रम आदर्श अध्यापन, बहुकक्षा शिक्षण, बहुस्तरीय शिक्षण,तथा कमजोर विद्यार्थियों के लिये विशेष शिक्षण में उपयोगी है। हेडस्टार्ट कार्यक्रम बाल मनोविज्ञान के सिद्धान्तों को ध्यान मे रखकर बनाया गया है तथा समुदाय के लोगों को सामान्य जानकारी के कुछ कार्यक्रम कम्प्यूटर समर्थित शिक्षा कार्यक्रम में दिये गये है।

मध्यप्रदेश में हेडस्टार्ट कार्यक्रम का क्रियान्वयन

विद्यार्थियों का मन ''जिज्ञासा का अथाह सांगर'' होता है। वे सम्पूर्ण विश्व को जानने की उत्सुकता रखते है। इस हेतु उनके मन में अनेकानेक प्रश्न उत्पन्न होते हैं। अधिकांश शालाओं में विद्यार्थियों को चुप रहने के लिये बाध्य किया जाता है, जबकि हेडस्टार्ट केन्द्र की शालाओं में बच्चों की जिज्ञासा को बढ़ावा दिया जाता है। इन केन्द्रों में कम्प्यूटर आधारित पाठों के द्वारा विद्यार्थियों की विचारहीनता की स्थिति को सक्रियता में बदलने का प्रयत्न किया जाता है। हेडस्टार्ट कार्यक्रम का क्रियान्वयन मध्यप्रदेश के 39 जिलों के 648 जन शिक्षा क्रेन्द्रों में 14 नवबंर 2000 से प्रारंभ होकर वर्तमान सत्र में प्रदेश के समस्त जिलों के 2718 जनशिक्षा केन्द्रों में चलाया जा रहा है।

हेडस्टार्ट कार्यक्रम की अवधारणा

प्रसिद्ध मनोविज्ञान थार्नडाइक के अनुसार ''सीखना किसी क्रिया के परिणामों पर निर्भर करता है यदि सीखने की क्रिया सुखद एवं मनोरंजक, तनाव कम करने वाली, उपयोगी, अभिप्रेरणात्मक एवं समाधान कारक एवं सूचनायुक्त हो तो सीखना प्रभावी व दीर्घकालिक होता है।'' इस कार्यक्रम को अवधारणा में यही बात परिलक्षित होती है। हेडस्टार्ट के अंर्तगत कम्प्यूटर के माध्यम से विद्यार्थी अपने समूह में स्व अधिगम कर सकते हैं; कठिन से कठिन विषयवस्तु भी विभिन्न माध्यमों– जैसे चित्र, आवाज, ध्वनि एनीमेशन आदि की सहायता से प्रस्तुत किए जाते हैं। इससे विषयवस्तु काफी सरल रोचक व आनंददायी हो जाता है, और अधिगम अधिक स्थायी होता है। हेडस्टार्ट कार्यक्रम में कम्प्यूटर समर्थित शिक्षा – कक्षा शिक्षण, शिक्षक व पाठ्यपुस्तक का विकल्प नहीं है, बल्कि यह इतना बहु आयामी है कि उपयुक्त सभी को संबल प्रदान होता है।

हेडस्टार्ट कार्यक्रम के उद्देश्य

हेडस्टार्ट कार्यक्रम के उद्देश्य इस प्रकार हैं :–

- विद्यार्थियों और शिक्षकों में स्वयं सीखने की प्रवृति का विकास करना।
- मिलजुलकर सीखने की प्रवृत्ति का विकास करना।
- पाठ्यपुस्तक के माध्यम से शिक्षण की सीमाओं को कम्प्यूटर की मल्टीमीडिया विशेषताओं से दूर करना।
- विद्यार्थियों के लिये सीखने की ऐसी परिस्थितियों का निर्माण करना जो आनंददायी, रूचिकर एवं तनाव कम करने वाली हों जिससे अधिगम प्रभावी और स्थायी हो सके।
- विद्यार्थियों एवं शिक्षकों के ज्ञान भंडार में वृद्धि करना।
- विद्यार्थियों एवं शिक्षकों को स्वमूल्यांकन करने में सहयोग देना।

हेडस्टार्ट कार्यक्रम की विशेषताऐं

शिक्षा में गुणात्मक सुधार के लिये कम्प्यूटर समर्थित शिक्षा प्रदान करने के उद्देश्य से कम्प्यूटर कार्यक्रमों का निर्माण किया जाता है। इन कम्प्यूटर कार्यक्रमों की निम्न विशेषताऐं है।

- स्व–अधिगम को प्रोत्साहन।
- स्व–मूल्यांकन के पर्याप्त अवसर।
- पाठ्यपुस्तक की विषय सामग्री के अतिरिक्त भी बहुत कुछ सीखने की सामग्री।
- "शिक्षक के लिये" आइकॉन में कम्प्यूटर सहित तथा कम्प्यूटर रहित गतिविधियॉ कराने हेतु मार्गदर्शन।
- बच्चों को अपनी गल्ती से सीखने और स्वयं निर्णय लेने के पर्याप्त अवसर।
- खेलों में कई बार जीतने हारने के अवसर।

शिक्षण विधि का विकास

हेडस्टार्ट कार्यक्रम में सूचना प्रौद्योगिकी के उपयोग द्वारा शिक्षा में गुणवत्ता व सुधार लाने का पूरा प्रयास किया गया है। सीखने की क्रिया स्वाभाविक रूप से सृजनात्मक होती है,। यह अंतः क्रिया के द्वारा सहज बनती है। हेडस्टार्ट के अन्तर्गत पाठ्य सामग्री को पुर्नःपरिभाषित एवं पुर्नःसंगठित करते हुए सूचना प्रौद्योगिकी निष्क्रिय शिक्षण हेतु सृजनात्मक विधि से सीखने में परिवर्तित कर सकता है, इस प्रकार प्रौद्योगिकी में परिवर्तन को शिक्षण दर्शन में परिवर्तन के रूप में देखा जा सकता है। कम्प्यूटर के द्वारा एक ऐसी शिक्षण विधि (Pedagogy) का विकास होता है जिससे प्रश्न पूछना, चुनाव करना तथा स्वअधिगम केन्द्र बिंदु बन जाते है।

16.2 हेडस्टार्ट कार्यक्रम की शैक्षणिक पृष्ठभूमि

हेडस्टार्ट उपागम शिक्षा के गुणात्मक सुधार के दर्शन एवं रणनीति पर आधारित है। हेडस्टार्ट कार्यक्रम को वर्तमान में उपलब्ध शैक्षणिक संसाधनों एवं रणनीतियों के आयामों को उन्नत करने, प्रसारित करने एवं सहयोगी साधन के रूप में देखा जाता है। साथ ही नये अवसरों द्वारा नई विचार एवं नई पद्धतियों के विकास को साधन के रूप में, प्रोतसाहित किया जाता है। यहाँ यह उल्लेखनीय है कि हेडस्टार्ट को वर्तमान संसाधनों एवं परस्पर अंर्तःक्रियाओं के मूल्य के विकल्प के रूप में नहीं देखा जाए वरण उनके गुणात्मक सुधार एवं संवृद्धि के वाहक के रूप में देखा जाए। हेडस्टार्ट की अकादमिक योजना अधिनिगम के उद्देश्यों एवं उन पर आधारित दक्षता, शिक्षक के क्षमता विकास, कक्षागंत गतिविधियों तथा बच्चों और शिक्षकों की ज्ञान वृद्धि हेतु नवीन द्वार खोलने जैसे पहलुओं (aspects) की पूर्ति करती है। इन पहलुओं को विभिन्न अकादमिक योगदान यथा – शिक्षक प्रशिक्षण, शैक्षणिक सामग्री एवं मूल्यांकन विधियों के सतत् एवं जटिल समीक्षा मूल्यांकन की प्रक्रिया

उपरांत पहचाना गया है। प्रभावी रूप से सीखने में आने वाली रूकावटों को हार्डस्पॉट (कठिन बिंदु) को पहचाना गया है। इन्हें सीखने–सिखाने की गतिविधियॉ जो कक्षा में अंतःक्रिया तथा विशिष्ट अकादमिक गतिविधि अथवा सेम्पल परीक्षण के माध्यम से प्रकट हुई है, के विश्लेषण के द्वारा निकाला गया है । इन कठिन बिन्दुओं का ज्ञान अथवा शिक्षण विधियों की समझ की व्यापक कमी के सूचक के रूप में लिया गया है। इस प्रकार इन पहलुओं को हल करने के लिये बहुआयामी रणनीति में मुद्रित सामग्री दूरस्थ शिक्षा, दृश्य–श्रव्य सामग्री (सी.डी. सहित) एवं परस्पर चर्चायें शामिल है, जो पाठों को विकसित एवं प्रसारित करने के लिये उपयोग में लाई गयी है। इस विविधतापूर्ण संचार व्यवस्था को संयुक्त रूप से मल्टीमीडिया से भरपूर पाठों के रूप में वर्णित किया गया है। हेडस्टार्ट कार्यक्रम का दूसरा महत्वपूर्ण उद्देश्य एक ऐसे शैक्षिक सॉफ्टवेयर का विकास करना है, जो ज्ञान के उन क्षेत्रों की जानकारी उपलब्ध करा सके जो प्रत्यक्ष रूप से विद्यालयी पाठ्यक्रम में सम्मिलित नहीं है। प्रायः यह अनुभव किया गया कि ये पाठ्य रूप से विद्यालीय पाठ्यक्रम में सम्मिलित नहीं है। मात्र पाठ्य चर्चा के द्वारा पाठ्यक्रम के संपूर्ण उद्देश्यों को प्राप्त नहीं किया जा सकता है। मूल समस्या पाठ्य चर्चा की व्यवहारगत कठिनाई, शैक्षणिक सत्र की अवधि एवं इस अवधि में बच्चों के सीखने योग्य स्तर की जानकारी देने की है। पाठ्य चर्चा एवं पाठ्य पुस्तकों की इन व्यवहारगत कठिनाईयों ने ही हमें ज्ञान संवर्द्धन के वैकल्पिक अधिगम स्त्रोतों की खोज एवं विकास के लिये प्रेरित किया है।

ज्ञानात्मक क्रियाओं एवं विवेचनात्मक दृष्टिकोण का विकास

हेडस्टार्ट ज्ञान के ऐसे क्षेत्रों पर आधारित पाठों की पहचान एवं विकास को अपना लक्ष्य बना रहा है, जो बच्चों में ज्ञानात्मक क्रियायें एवं विवेचनात्मक दृष्टिकोण विकसित करते है। यहाँ यह आवश्यक नहीं हैं कि ये बिंदु पाठ्य पुस्तकों में आवश्यक रूप से समाहित ही हों। इस प्रकार के ज्ञान आधारित पाठ विभिन्न संकायों के मध्य अर्न्तःक्रिया स्थापित करने की क्षमता विकसित करने में सहायक होते हैं । इसके फलस्वरूप ये बच्चों में सैद्धांतिक समझ को उन्नत करते है। ये पाठ ज्ञान के विभिन्न स्तरों को संगठित कर इस प्रकार से संयोजित करते हैं कि बच्चें इन्हें अपने स्वाभाविक गति से सीख सकें। वस्तुतः ये पाठ्य पुस्तकों पर आधारित ज्ञान को सीखने में सहायक होते है क्योंकि ये दृश्य–श्रव्य कल्पना एवं अनुभवगत अधिगम को प्रेरित करते है। यहॉं यह उल्लेख करना होगा कि यह ''ज्ञान'' आधारित पाठ केवल ज्ञानात्मकवृद्धि के ही नहीं, अपितु ये वार्ता एवं चर्चा को भी बढ़ावा देते है। कम्प्यूटर की स्क्रीन पर ज्ञान के विभिन्न स्त्रोतों को लाकर बच्चों को इन क्षेत्रों में क्रिया के लिये प्रेरित करने एवं आगामी जिज्ञासा एवं सूचना की पूर्ति हेतु पुनः कम्प्यूटर के स्क्रीन पर लाने से उनमें संज्ञानात्मक क्रिया हेतु आवश्यक सृजानात्मक प्रेरणा का विकास भी संभव है।

हेडस्टार्ठ दक्षताओं के संप्रेषण का सशक्त माध्यम

इस प्रकार हेडस्टार्ट अकादमिक योजना के इस व्यापक दर्शन एवं रणनीतिक रूप रेखा का ही एक अंग है। हेडस्टार्ट पाठों के लिए विषय–वस्तु का चुनाव शैक्षाणेक आवश्यकता के इस व्यापक परिदृश्य एवं इसके लिए आवश्यक सर्वोतम उपयुक्त विधियों की दृष्टि से किया जाता है। इस प्रकार हेडस्टार्ट एक पृथक अनुप्रयोग न होकर समग्र शैक्षणिक योजना का ही अभिन्न एवं समेकित हिस्सा है। अतएव,, यह कहा जा सकता है कि हेडस्टार्ट पाठ शालेय पाठ्य–पुस्तक के पाठों का महज इलेक्ट्रानिक रूपांतरण न होकर सूचना प्रौद्योगिकी के उपयोग के साथ दक्षताओं के विकास का सशक्त माध्यम है।

हेडस्टार्ट कार्यक्रम में कम्प्यूटर की भूमिका

शिक्षण में अनेक अवधारणायें मूर्त होते हुए भी कक्षा में उन पर केवल चर्चा ही की जा सकती है, उन्हें प्रस्तुत नहीं किया जा सकता।जैसे बाजार, पोस्ट आफिस, बस स्टेण्ड आदि की गतिविधियां। वीडियो कैसेट की सहायता से इनको कक्षा में प्रस्तुत तो किया जा सकता है परंतु कम्प्यूटर के

माध्यम से वीडियों और एनीमेशन का उचित प्रयोग करके सीखने के क्षेत्रों में वृद्धि करके शिक्षा को अत्तःक्रियात्मक (Interactive) किया जा सकता है। इस तरह किसी भी अवधारणा को कम्प्यूटर के माध्यम से समृद्ध (Enrich) करना संभव है। कम्प्यूटर से शिक्षा को रोचक तथा चुनौती भरा बनाना आसान है, क्योंकि इसमें विकल्पों की लंबी श्रृंखला दी जा सकती है। जिनसे छात्र अपनी जिज्ञासा को संतुष्ट करते हुए खोजी प्रवृति को विकसित कर सकता है। कम्प्यूटर के माध्यम से सीखने की मुख्य विशेषता यह है कि सीखने वाले को स्वयं द्वारा की गई त्रुटियों की तुरंत जानकारी मिल जाती है। इससे छात्र त्रुटियॉ नही करने के प्रति सचेत हो जाता है। परिणामस्वरूप छात्र के मस्तिष्क में चिंतन और मनन की प्रक्रिया चलती रहती है। जिससे कम समय में ही अधिक सीखना संभव हो जाता है।

पठन–पाठन की प्रक्रिया जितनी रोचक और उतेजना प्रदान करने वाली होगी बच्चों के सीखने के स्तर में उतनी तीव्रता से वृद्धि होगी। यही बात शिक्षकों पर भी लागू होती है। शिक्षकों द्वारा संचालित पठन–पाठन प्रक्रिया भी तभी गुणात्मक होती है जब वे स्वयं प्रेरित होकर उसके साथ जुडें। शिक्षा में रूचि और प्रेरणा मूलतः सीखने की प्रक्रिया को प्रभावित करती हैं। सीखने की प्रक्रिया अंतः–कियात्मक ;प्दजमतंबजपअमद्ध बनाने का एक सक्षम उदाहरण कम्प्यूटर है। कम्प्यूटर के माध्यम से व्यक्ति स्वयं बहुत कुछ सीखता है। कम्प्यूटर आधारित शिक्षा की प्रक्रिया ही इस प्रकार की है कि वह व्यक्ति की जिज्ञासा, सोच और विश्लेषण की शक्तियों के अनेक क्षेत्र उपलबध कराती है।

हेडस्टार्ट कार्यक्रम क्रियान्वयन का केन्द्रबिन्दु – जन शिक्षा केन्द्र

कम्प्यूटर से अंतः–क्रियात्मक (Interactive) शिक्षा का लाभ सीधे माध्यमिक स्कूल तथा प्राथमिक स्कूलों के विद्यार्थियों तक योजनाबद्ध तरीके से पहुंचाने की योजना बनाई गई है। इसके लिये चयनित जनशिक्षा केन्द्र को हेडस्टार्ट कार्यक्रम के क्रियान्वयन का मुख्य आधार माना गया है। हेडस्टार्ट अंतः–कियात्मक केन्द्र में कम्प्यूटर से पारस्परिक शिक्षा की शुरूआत से जनशिक्षा केन्द्र के शिक्षक व उस हेडस्टार्ट केन्द्र के विद्यार्थी इस कार्यक्रम से लाभान्वित होगें। इसके अतिरिक्त जन शिक्षा केन्द्र की अन्य शालाओं के विद्यार्थियों को भी समय–समय पर कम्प्यूटर के माध्यम से रूचिकर शिक्षा प्राप्त करने के अनेक अवसर प्राप्त होते है।

जनशिक्षा केन्द्र स्तर की मासिक बैठकों में अन्य शालाओं के शिक्षकों को कम्प्यूटर के माध्यम से शिक्षा के मूलभूत विषयों के संबंध में जानकारी भी दी जा रही है। भाषा, गणित व पर्यावरण की विषयवस्तु में आ रही अकादमिक कठिनाइयों को कम्प्यूटर में उपलब्ध साफ्टवेयर कार्यक्रमों के माध्यम से हल कर जन शिक्षा केन्द्रों की बैठकों को अकादमिक बनाकर शिक्षकों की व्यवसायिक दक्षता में वद्धि की जा रही है।

जिला प्राथमिक शिक्षा कार्यक्रम व सर्वशिक्षा अभियान के अंतर्गत जिलों में आवंटित लक्ष्यानुसार जनशिक्षा केन्द्रों का चयन किया गया है। चयन के मापदण्ड में ऐसे जन शिक्षा केंद्रों को प्राथमिकता दी गई है जहां कि प्राथमिक व माध्यमिक शाला साथ–साथ लगती हो। हेडस्टार्ट कार्यक्रम के लिये पर्याप्त व सुविधाजनक कक्ष के साथ–साथ विद्युत की उपलब्धता को ध्यान में रखा गया है।

हेडस्टार्ट कार्यक्रम हेतु सूचना प्रौद्योगिकी सुविधायें

प्रत्येक हेडस्टार्ट केन्द्र में कम्प्यूटर समर्थित शिक्षा प्रदान करने की दृष्टि से निम्न सुविधायें दी गई है।

- तीन मल्टीमीडिया कम्प्यूटर,
- तीन यू.पी.एस. (4 घंटे बैकअप),
- एक डाटा मैट्रिक्स प्रिंटर,

- आवश्यक कम्प्यूटर टेबल व स्टूल,
- बुक शेल्फ, व्हाईट बोर्ड, पिनअप बोर्ड,
- आपरेटिंग सिस्टम सी.डी. एवं मैनुअल, एवं
- संदर्भ पुस्तकें।

हेडस्टार्ट कार्यक्रम हेतु प्रशिक्षण

हेडस्टार्ट केन्द्र के चयनित शिक्षकों को मध्य प्रदेश भोज (मुक्त) विश्वविद्यालय के सहयोग से 10 दिवसीय पूर्ण कालिक प्रशिक्षण दिया गया। प्रशिक्षण कार्यक्रम में दो पक्ष लिए गये– तकनीकी पक्ष का प्रशिक्षण म.प्र. भोज (मुक्त) विश्वविद्यालय द्वारा एवं शैक्षिक पक्ष का प्रस्तुतिकरण राजीव गांधी शिक्षा मिशन/राज्य शिक्षा केन्द्र द्वारा किया गया। शिक्षकों के अथक प्रयासों व नवाचारों से प्रेरित होकर संभागियों को अधिक संक्षम बनाने, रचनात्मक सोच को कार्यरूप में परिणित करने व कक्षा शिक्षण हेतु उनकी कल्पना को स्वयं द्वारा साकार रूप देने के लिये – ऐनीमेशन हेतु प्रयुक्त साफ्टवेयर का भी 10 दिवसीय प्रशिक्षण प्रदान किया गया। परिणामतः ग्रामीण क्षेत्रों के जनशिक्षा केन्द्रों में कार्यरत इन प्रतिभाओं ने नवाचारों की लम्बी व सारगर्भित श्रृंखला बना दी।

इन प्रशिक्षणों में कम्प्यूटर का प्रबधंन तथा पाठ्यपुस्तक की कठिन अवधारणाओं को सरलीकृत कर कैसे अध्यापन करें? संपूर्ण जानकारी दी जा रही है। सूचना प्रौद्योगिकी के इस युग में शिक्षक समय के साथ अपने अध्यापन की प्रतिभा को परिमर्जित कर सकें, हेडस्टार्ट के इन प्रशिक्षणों का यही प्रमुख उद्देश्य है

हेडस्टार्ट केन्द्र में शैक्षणिक गतिविधियॉं

कम्प्यूटर आधारित अधिगम में ''कम्प्यूटर गतिविधियों'' की महत्वपूर्ण भूमिका है। सी.डी. न तो शिक्षक का विकल्प है और न ही पूर्ण शिक्षण। सी.डी. में दिए गए विषय वस्तु के सुदृढीकरण हेतु कम्प्यूटर गतिविधियॉं अत्यंत आवश्यक हैं। कम्प्यूटर गतिविधियॉं दो प्रकार से हो सकती है :

- कम्प्यूटर आधारित गतिविधियाँ
- कम्प्यूटर रहित गतिविधियाँ

कम्प्यूटर आधारित गतिविधियॉं

वे गतिविधियॉं जो विद्यार्थियों एवं शिक्षकों द्वारा अधिगम हेतु कम्प्यूटर के माध्यम से संचालित की जाती है, कम्प्यूटर आधारित गतिविधियॉं कहलाती है,। इन गतिविधियों में कम्प्यूटर का होना अत्यन्त आवश्यक है। इनमें वे सभी गतिविधियॉं समाहित है जो कि सी.डी. में दी गई है।

कम्प्यूटर आधारित गतिविधियों के प्रमुख उद्देश्य

- *खेल भावना को प्रोत्साहित करना:* सी.डी. में विषय वस्तु को रोचक एवं ज्ञान वर्धक बनाने के लिये कई खेलो को समाहित किया गया है। इससे बच्चें न केवल खेल–खेल में विषयवस्तु को समझ सकते है, वरन् उनमें एक स्वस्थ प्रतिभागी के गुणों का विकास होता है। इसीलिए बच्चों को खेल खेलने के पूरे अवसर दिए जाएं जब तक कि बच्चें खेल में ही पूरी तरह दक्षता प्राप्त न कर लें।

- *समूह अधिगम को प्रोत्साहित करना:* सी.डी. द्वारा अधिगम का एक महत्वपूर्ण उद्देश्य है टोलियों में सीखने की प्रवृत्ति को बढ़ाना। टोलियों में बच्चें स्वयं तो सीखते ही हैं साथ ही साथ अपने साथियों को सिखाने में मदद करते है।

- *मीडिया साक्षरता को प्रोत्साहित करना:* कम्प्यूटर के माध्यम से बच्चे को इलेक्ट्रॉनिक मीडिया से परिचित करना। जैसेः इंटरनेट, ई–मेल एवं अन्य उपलब्ध साफ्टवेयर।
- *कम्प्यूटर उपकरण (की–बोर्ड, माऊस) के उपयोग को प्रोत्साहित करना:* सी.डी. में दिए गए कार्यक्रमों को इस तरह बनाया गया है जिससे बच्चे ज्यादा से ज्यादा माऊस एवं की–बोर्ड का उपयोग कर सकें। अतः बच्चों को इनके उपयोग के पर्याप्त अवसर प्राप्त होना चाहिऐं।
- *स्व–मूल्यांकन हेतु प्रेरित करना:* इन कार्यक्रमों के अंर्तगत ऐसी व्यवस्था की गई है कि बच्चे अपने सीखे गए ज्ञान का मूल्यांकन स्वयं कर सकें। जिससे बच्चों को अपना मूल्यांकन स्वयं कर करने की प्रेरणा मिल सकें।
- *स्व–अधिगम को प्रोत्साहित करना:* कम्प्यूटर सहित गतिविधियों का महत्वपूर्ण उद्देश्य यह है कि सी. डी. के माध्यम से बच्चे स्वयं सीख सकें अतः सी.डी. में ऐसे कार्यक्रमों का विकास किया गया है, जिसमे बच्चे अन्तःक्रिया के माध्यम से स्वयं सीख सकते हैं।
- *खोजी प्रवृति का विकास करना:* अपनी गलतियों को स्वयं सुधारने एवं की गई गल्ती के कारणों को खोजने के पर्याप्त अवसर कार्यक्रमों में उपलब्ध है। इससे बच्चें में खोजी प्रवृत्ति का विकास होता है।
- *गलतियों के सुधार हेतु सही हल ख़ोजने के लिये पर्याप्त अवसर देकर प्रोत्साहित करना:* कार्यक्रमों को इस प्रकार से तैयार किया गया है, जिसमें बच्चों द्वारा स्वयं की गई गलती को स्वयं सुधार सकें।
- *आँख एवं हाथ की गतिविधियों में परस्पर समन्वय:* कम्प्यूटर पर कार्य करते समय बच्चें को की–बोर्ड एवं माऊस पर अधिकार प्राप्त करना होता है इसलिए उसे ऑख एवं हाथ की गतिविधियों का समन्वय करने का पर्याप्त अवसर मिलता है।

कम्प्यूटर आधारित गतिविधियॉ कैसे?

कम्प्यूटर आधारित गतिविधियॉ करते समय बच्चों के समूह को निम्न तरीके से व्यवस्थित किया जा सकता है–

- *कम्प्यूटर के एकल अधिगम उपयोग:* जिसमें एक विद्यार्थी कम्प्यूटर में गतिविधियों को संचालित करें।
- *कम्प्यूटर का 3 से 5 के समूह में उपयोग:* जिसमें 3 से 5 के समूह में विद्यार्थी कम्प्यूटर आधारित गतिविधियों को संचालित करें।
- *कम्प्यूटर का छोटे समूह (15–20) मे उपयोग:* इस समूह में वे कार्यक्रम संचालित किए जाऍगे, जिन्हे कक्षा 1 व 2 के लिए तैयार किया गया है। ये ऐसे कार्यक्रम है जिनमें प्रदर्शन एवं अन्तःक्रिया को सम्मिलित किया गया है।

कम्प्यूटर रहित गतिविधियॉ : इनके निम्नलिखित उद्देश्य हैं।

- विषय वस्तु को सीखने के प्रति रूचि जागृत करना।
- संबंधित विषय की प्रारंभिक अवधारणा स्पष्ट करना।
- कक्षा शिक्षण में विषयवस्तु का पुनर्बलन करना।
- सी.डी. में दी गई विषयवस्तु का पुनर्बलन करना।
- समूह की गतिविधियों में स्व–मूल्यांकन करना।
- सैद्धांतिक पक्षों को दैनिक जीवन के व्यावहारिक उपयोग हेतु प्रोत्साहित करना।
- सृजनात्मकता को प्रोत्साहित करना।

कम्प्यूटर रहित गतिविधियॉ कैसे?

कम्प्यूटर की गतिविधियो को कक्षा में अथवा मैदान में समूह बनाकर आयोजित की जा सकती है। गतिविधियॉ निम्नलिखित तरीकों से की जा सकती है :–

- शैक्षिक खेलों के द्वारा
- गीतों के द्वारा
- बच्चों से चर्चा के द्वारा
- पहेलियों के द्वारा
- वाद–विवाद प्रतियोगिता आयोजित कर
- प्रश्न पूछकर
- सृजनात्मक गतिविधियों के द्वारा

उक्त तरीकों का चयन शिक्षक अपनी सुविधा एवं बच्चों की रूचि के अनुसार करता है।

कम्प्यूटर गतिविधियों में शिक्षक की भूमिका

कम्प्यूटर गतिविधियों के संचालन में शिक्षक की महत्वपूर्ण भूमिका है । कभी वह बच्चों को प्रोत्साहित करने का काम करता है, तो कभी वह मित्र के रूप में बच्चें की मदद करता है।

- *प्रेरक के रूप में:* प्रेरक के रूप में शिक्षक को चाहिए कि वह बच्चों के भय को दूर कर कम्प्यूटर के प्रति लगाव एवं आर्कषण उत्पन्न करें । उन्हें कम्प्यूटर छूने तथा चलाने के पर्याप्त अवसर प्रदान करें।
- *सुविधादाता के रूप में:* सुविधादाता अर्थात बच्चों का मददगार। सुविधादाता के रूप में शिक्षक को चाहिए कि वह बाल केन्द्रित अधिगम को प्रोत्साहित करें तथा कम्प्यूटर तथा सी.डी. संचालन में आवश्यकतानुसार बच्चों का सहयोग करे। सी.डी. की विषयवस्तु या खेल के सम्बन्ध में बच्चों की जिज्ञासा को शांत करें। अध्यापक को ध्यान रखना चाहिए कि जब बच्चें पूछें तभी वह उन्हें बताए, और बच्चों को अपनी गलतियॉ का सुधार करने के पर्याप्त अवसर प्रदान करें।

16.3 हेडस्टार्ट : जन शिक्षा केन्द्र, सालीवाडा

जबलपुर मध्यप्रदेश के प्रमुख नगरों मे से एक है जो जाबालि ऋषि की नगरी होने के कारण पहले जबालिपुरम् के नाम से जाना जाता था। मुगलों से स्वतंत्रता संग्राम में अपराजेय रानी दुर्गावती की शौर्यस्थली, मध्यप्रदेश की जीवनरेखा नर्मदा नदी के किनारे स्थित जबलपुर विश्व प्रसिद्ध संगमरमर की चट्टानों के साथ–साथ भेड़ाघाट तथा चौसठ योगिनी मंदिर के लिए ख्याति प्राप्त है।

जबलपुर जिले के सात विकासखण्डों में से जबलपुर ग्रामीण विकासखण्ड में नर्मदा नदी की सहायक गौर नदी के किनारे जबलपुर–जिला मुख्यालय से 14 किलोमीटर दूर जबलपुर–मडंला रोड़ पर "सालीवाडा जन शिक्षा केन्द्र" स्थित है। इस जन शिक्षा केन्द्र में 3 माध्यमिक शालायें, 5 प्राथमिक शालायें व 2 शिक्षा गांरटी शालायें सम्मिलित है। सालीवाडा जनशिक्षा केन्द्र में कक्षा एक 1 से 8 तक कुल 15 वर्गो में 778 विद्यार्थी अध्ययनरत है। शाला में प्रधानाध्यापक सहित 18 शिक्षक – शिक्षिकायें कार्यरत है।

सर्वशिक्षा अभियान के अन्तर्गत जिले में 6 विकासखण्डों में 45 जन शिक्षा केन्द्रों में हेडस्टार्ट कार्यक्रम का क्रियान्वयन सत्र 2002–03 में प्रारम्भ किया गया। जिसमें सालीवाड़ा जनशिक्षा केन्द्र भी सम्मिलित है। सत्र 2002–03 के पूर्व कुण्डम विकासखण्ड के 6 जन शिक्षा केन्द्रों मे हेडस्टार्ट कार्यक्रम चल रहा है । सत्र 2002–03 से सालीवाड़ा जन शिक्षा केन्द्र में जनवरी 2003 में कम्प्यूटर

प्रदाय किये गये। सत्र 2003–04 से सालीवाड़ा जन शिक्षा केन्द्र में नियमित रूप से हेडस्टार्ट कार्यक्रम का क्रियान्वयन प्रारंभ हुआ। समुदाय के बीच में हेडस्टार्ट केन्द्र में कम्प्यूटर के प्रयोग से शिक्षण कार्य का प्रचार / प्रसार कर प्रशिक्षित शिक्षकों ने विद्यार्थियों को गुणवता सुधार की दिशा में प्रयास किये। जन शिक्षा केन्द्र में हेड स्टार्ट के कार्यक्रम के अंतर्गत विद्यार्थियों को सीधे ही कम्प्यूटर संचालन की कार्यप्रणाली से परिचित किया गया। विद्यार्थी बहुत कम समय में कम्प्यूटर प्रौद्योगिकी से परिचित हो जाते हैं। इसके माध्यम से जानकारी, ज्ञान और कल्पना की असीम दुनिया के साथ परिचित कराया गया है। जनशिक्षा केन्द्र की शाला की कक्षा 1 से 8 के समस्त विद्यार्थियों को कम्प्यूटर प्रशिक्षण देकर कम्प्यूटर के प्रयोग से परिचित कराया गया है। कम्प्यूटर समर्थित शिक्षण हेतु शाला के समयचक्र में समय निर्धारित कर विषयों की प्रासंगिकता के आधार पर व्यवस्था की गई है।

सालीवाडा जनशिक्षा केन्द्र का कार्यक्रम

सालीवाडा जनशिक्षा केन्द्र की मासिक बैठक में भी कम्प्यूटर के माध्यम से अन्य शालाओं के शिक्षकों को अकादमिक मार्गदर्शन देते हुए कठिन विषयवस्तु का प्रस्तुतीकरण करके सरल बनाया जाता है। जिससे जन शिक्षा केन्द्र की अन्य शालाओं के शिक्षकों को लाभ मिल रहा है। सप्ताह का एक दिन सभी शिक्षकों के स्वशिक्षण एवं पारस्परिक शिक्षण के लिये निर्धारित है।

इस प्रकार विभिन्न कार्यक्रमों के माध्यम से शाला के शिक्षकों द्वारा उल्लासपूर्ण वातावरण में विद्यार्थियों में स्वअधिगम के पर्याप्त अवसर उपलब्ध कराये जा रहे है। अधिगम वातावरण के निर्माण हेतु कम्प्यूटर रहित व कम्प्यूटर आधारित गतिविधियों द्वारा शिक्षकों की अधिगम प्रक्रिया में सहायता मिलती है। इस कार्यक्रम के माध्यम से शिक्षकों ने महसूस किया कि कार्यक्रम की विषयवस्तु से पाठ्यपुस्तक में दी गई सामग्री से विद्यार्थियों के सामर्थ्य में वृद्धि हुई है। कार्यक्रम की विषयवस्तु से अकादमिक कमियाँ दूर हुईं व रंग, दृश्य, गति, ध्वनि, प्रभाव के उचित संमिश्रण से विद्यार्थियों की कठिन अवधारणायें सरल हुई हैं। विद्यार्थियों को विषयवस्तु के साथ अन्तःक्रियात्मक ढंग से सीखने व स्वमूल्याकंन के पर्याप्त अवसर प्राप्त हुये है। इस कार्यक्रम के माध्यम से विद्यार्थियों की सृजनशीलता का भी विकास हुआ है, जिससे क्रियाशीलता को बढ़ावा मिला है ।

- विद्यार्थियों द्वारा अपनी पत्रिका का निर्माण किया गया। कुछ कक्षाओं द्वारा हस्तलिखित व कुछ कक्षाओं ने कम्प्यूटर माध्यम का प्रयोग किया।
- भित्ति पत्रक निर्माणकर कलात्मक ढंग से सजाकर नूतन जानकारी प्रदर्शित की गई जिसकी अभिभावकों द्वारा भरपूर सराहना की गई।
- कम्प्यूटर द्वारा बनाये गये चित्रों पर कहानी लिखकर बालसभा में सुनाई तथा चित्र प्रदर्शित किए गए।
- कम्प्यूटर द्वारा बनायें गये चित्रों की प्रदर्शनी लगाई गई।
- पहेलियां बनाकर हल की गई।
- कविताओं की रचना तथा उन्हें प्रकाशित किया गया ।
- गणितीय खेलों से मंनोरंजन किया गया।

हेडस्टार्ट के अंतर्गत उपयोग में आ रहे कम्प्यूटर कार्यक्रम

1) *मैं और मेरा घरः* यह कार्यक्रम प्राथमिक स्तर के विद्यार्थियों में अंग्रेजी शब्दों की जानकारी (जानवरों के बच्चों तथा उनके रहने के स्थानों के नाम, क्रियाशब्द) एवं छोटे–छोटे वाक्य संरचनाओं के विकास हेतु है।

2) *हेरफेर का अंतरः* यह कार्यक्रम मात्राओं के उचित प्रयोग संबंधी खेलों पर आधारित है। मात्राओं के गलत प्रयोग से किस तरह अर्थ बदल जाता है, इसे रोचक तरीके से इस कार्यक्रम में दिया गया है।

3) *हिस्से के किस्सेः* इस कार्यक्रम द्वारा प्राथमिक स्तर के विद्यार्थियों को भिन्न की जानकारी तथा छोटी भिन्न एवं भिन्नों की तुलना आदि की अवधारणा को स्पष्ट करने का प्रयास किया गया है।

4) *भिन्न कैसी–कैसीः* इस कार्यक्रम मे प्राथमिक स्तर के विद्यार्थियों को स्वअधिगम परक विधि से क्या है 'आधा', कौन बड़ा 'किससे' एवं 'माथा पच्ची' आदि रोचक कार्यक्रमों के माध्यम से भिन्न सम्बन्धी अवधारणाओं को स्पष्ट किया गया है।

5) *मात्रा की यात्राः* इस कार्यक्रम में हिन्दी भाषा के प्रमुख एवं प्रचुर मात्रा में उपयोग होने वाले स्वरों एवं उनका मात्राओं के रूप मे प्रयोग कैसे किया जाता है, को स्पष्ट किया गया है।

6) *आओ अंग्रेजी सीखेः* यह कार्यक्रम प्राथमिक स्तर के विद्यार्थियों के लिये है। इसमें खेल–खेल में न केवल अंग्रेजी की वर्णमाला को पहचानने व पढ़ने का अभ्यास है अपितु उनसे शुरू होने वाले शब्दों का ज्ञान भी कराया जाता है।

7) *सौर मंडल की सैरः* इस कार्यक्रम के माध्यम से माध्यमिक स्तर के विद्यार्थियों को सौर मंडल के विभिन्न ग्रहों की जानकारी दी गई है एवं जिज्ञासा के माध्यम से कौतूहलपूर्ण प्रश्नों का समाधान किया गया है।

8) *क्या छुपा है भोजन मेंः* यह कार्यक्रम माध्यमिक स्तर के लिये विद्यार्थियों एवं प्राथमिक स्तर के शिक्षकों के लिए है। इसके माध्यम से स्थानीय रूप से उपलब्ध भोज्य पदार्थो के मुख्य पोषक तत्वों, उनकी कमी से होने वाले रोग एवं उनकी कमी की पूर्ति के बारे मे जानकारी दी गई है।

9) *जंगल दरबारः* इस कार्यक्रम में पर्यावरण संबधी ज्ञान के साथ–साथ हिन्दी एवं अंग्रेजी माध्यम मे पशु–पक्षियों के नाम, उनकी बोली, पर्यायवाची शब्द और खेल के माध्यम से तर्कशक्ति का विकास करने का प्रयास किया गया है।

10) *संख्याओं की समझः* इसके माध्यम से प्राथमिक स्तर तक के विद्यार्थियों में संख्या कठिन अवधारणाओं के साथ–साथ संख्या परिचय, परिमेय व अपरिमेय संख्याएं, संख्याओं पर संक्रियाओं आदि की अवधारणात्मक समझ विकसित करने का प्रयास किया गया है।

11) *वर्णो की पहचानः* यह कार्यक्रम वर्णमाला की सभी ध्वनियों के स्पष्ट एवं मानक उच्चारण तथा वर्णो के मानक रूप को दृष्टिगत रखते हुए निर्मित की गई है। इस कार्यक्रम का उपयोग कक्षा 1 व 2 के छात्रों एवं प्रौढ़ साक्षरता हेतु किया जा सकता है। अहिन्दी भाषी व्यक्ति भी इसके द्वारा हिन्दी की ध्वनियों का उच्चारण एवं लेखन सीख सकेंगे।

12) *रंग बिरंगी दुनियाः* प्रस्तुत कार्यक्रम में प्राथमिक स्तर के विद्यार्थियों को अंग्रेजी में विभिन्न रंगों से परिचय शब्द भंडार बढ़ाने तथा सुनकर समझने के कौशल का विकास करने का प्रयास किया गया है।

13) *खेल–खेल में गणितः* इस कार्यक्रम के माध्यम से प्राथमिक स्तर के विद्यार्थियों एवं नवसाक्षरों के लिये संख्याओं की पहचान करने, मानसिक योग्यता एवं तर्कशक्ति के विकास करने का प्रयास किया गया है।

14) *हेडस्टार्ट एक अभियानः* यह कार्यक्रम हेडस्टार्ट शिक्षकों के प्रशिक्षण के उद्धेश्य से निर्मित किया गया है। इसमें हेडस्टार्ट कार्यक्रम को संचालित करने से संबंधित विभिन्न अकादमिक, प्रबंधकीय तथा तकनीकी पहलुओं को वीडियों फिल्म के माध्यम से अंतःक्रियात्मक पद्धति से स्पष्ट किया गया है।

15) *कम्प्यूटर की दुनिया:* इस कार्यक्रम में कम्प्यूटर की कार्यप्रणाली एवं किसी साफ्टवेयर को विकसित करने हेतु तार्किक आकलन का परिचय दिया गया है तथा तकनीकी शब्दावली को स्पष्ट किया गया है।

16) *मापन:* विद्यार्थियों को मापन जैसी महत्वपूर्ण अवधारणा से परिचित कराने के उद्देश्य से इस कार्यक्रम का निर्माण किया गया है। इस में कहानी एवं रोचक गतिविधियों के माध्यम से लंबाई मापन मात्रकों के आपसी संबंध तथा अंर्तराष्ट्रीय मानक मात्रकों की समझ प्रदान करने का प्रयास किया गया है ।

17) *चतुर गीदड़:* यह कार्यकम हिन्दी भाषा में कक्षा 4 एवं 5 के लिये उपयुक्त है।

18) *हमारा संविधान:* यह कार्यकम सामाजिक विज्ञान विषय में कक्षा 5 व 8 हेतु उपयुक्त है।

19) *आओ खेले:* यह कार्यकम अग्रेजी भाषा में कक्षा 2 एवं 5 के लिये उपयुक्त है।

20) *मेरी दूकान:* यह कार्यकम अग्रेजी भाषा में कक्षा 4 एवं 6 के लिये उपयुक्त है।

21) *कुपोषण:* यह कार्यकम विज्ञान विषय में विभिन्न कक्षाओं के लिये उपयुक्त है।

22) *पौधे की जीवनगाथा:* विज्ञान विषय में कक्षा 4 एवं 7 के लिये उपयुक्त है।

23) *विद्युत (भाग 1 व 2):* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

24) *पदार्थ की दुनिया:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

25) *मानव कंकाल:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

26) *तत्वों का रोचक संसार:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

27) *कार्बन:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

28) *परावर्तन:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

29) *ग्रहण:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

30) *स्वच्छ जल स्वस्थ्य मन:* विज्ञान विषय में कक्षा 4–7 के लिये उपयुक्त है।

31) *भोजन का परिरक्षण:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

32) *रसायनिक क्रियायें क्यों और कैसे:* विज्ञान विषय में कक्षा 6–8 के लिये उपयुक्त है।

33) *सांख्यिकी:* सांख्यिकी / गणित विषय में कक्षा 6–8 के लिये उपयुक्त है।

34) *दण्ड चित्र:* सांख्यिकी / गणित विषय में कक्षा 6–8 के लिये उपयुक्त है।

35) *बीजीय व्यंजक:* गणित विषय में कक्षा 6–8 के लिये उपयुक्त है।

36) *क्षेत्रफल:* गणित विषय में कक्षा 6–8 के लिये उपयुक्त है।

37) *बिंदु की कहानी:* गणित विषय में कक्षा 4–8 के लिये उपयुक्त है।

38) *ताम्र युग:* सामान्य ज्ञान हेतु विभिन्न कक्षाओं के लिये उपयुक्त है।

39) *पानी बिन सब सून:* सामान्य ज्ञान हेतु विभिन्न कक्षाओं के लिये उपयुक्त है।

40) *रहिमन पानी राखिये:* सामान्य ज्ञान हेतु विभिन्न कक्षाओं के लिये उपयुक्त है।

41) *औसत:* गणित विषय में कक्षा 5,6,7,8 के लिये उपयुक्त है।

42) *वर्ग और वर्गमूल:* गणित विषय में विभिन्न कक्षाओं के लिये उपयुक्त है।

43) *काल चक्र:* सामान्य ज्ञान हेतु विभिन्न कक्षाओं के लिये उपयुक्त है।

44) *ब्रेन क्रिकेट:* सामान्य ज्ञान व स्वमूल्याकन हेतु विविध कक्षाओं हेतु उपयुक्त है।

45) *श्याम की चिठ्ठी:* हिन्दी भाषा में कक्षा 6–8 के लिये उपयुक्त है।

46) *भाषा के रंग बच्चों के संग:* हिन्दी भाषा में कक्षा 6 – 8 हेतु उपयुक्त है।

47) *आओ खेलें:* अंग्रेज़ी विषय मे कक्षा 2–5 के लिये उपयुक्त हैं।

48) *मेरी दूकान:* अंग्रेज़ी विषय मे कक्षा 4–6 के लिये उपयुक्त हैं।

उपरोक्त सी.डी. के अतिरिक्त और शैक्षिक साफ्टवेयर निर्माण किया गया है, जो कि विद्यार्थियों के लिये अति उपयोगी है।

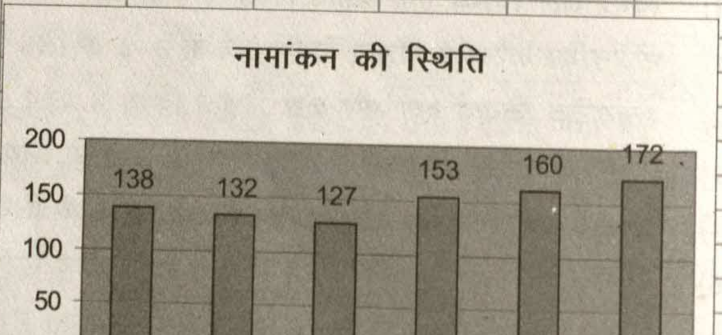
शैक्षिक कम्प्यूटर साफ्टवेयर निर्माण हेतु राजीव गांधी शिक्षा मिशन में एक हेडस्टार्ट प्रकोष्ठ का गठन किया गया है। इसका कार्य विभिन्न विषयों में मल्टीमीडिया से परिपूर्ण साफ्टवेयर बनाना तथा इनका जन शिक्षा केन्द्रों पर वितरण करना है। इस प्रकोष्ठ द्वारा हिन्दी, अंग्रेजी, गणित, पर्यावरण अध्ययन, विज्ञान तथा कम्प्यूटर विषय पर कार्यक्रम तैयार किये जाते है।

हेडस्टार्ट कार्यक्रम का प्रभाव व उपलब्धियाँ

हेडस्टार्ट–कम्प्यूटर समर्थित शिक्षा योजना शिक्षा मनोविज्ञान के मूलभूत सिंद्धात पर आधारित है। इस कार्यक्रम के माध्यम से स्वयं सीखना, गलतियां करके सीखना, भयरहित वातावरण में सीखना, आनंददायी परिस्थिति में सीखना आदि समाहित है। कार्यक्रम के क्रियान्वयन हेतु किये गये प्रयास में आशातीत सफलता प्राप्त हुई, जो इस प्रकार है।

नामांकन में वृद्धि: गत 6 वर्षो में प्रवेश के आंकड़ों का अवलोकन करने से स्पष्ट है कि हेडस्टार्ट कार्यक्रम सफलता प्राप्त कर रहा है। सत्र 2002–03 में 20 प्रतिशत, सत्र 2003–04 में 5 प्रतिशत, सत्र 2004–05 में 7.5.प्रतिशत नामांकन वृद्धि हुई है जो हेडस्टार्ट कार्यक्रम के प्रभाव को दर्शाता है।

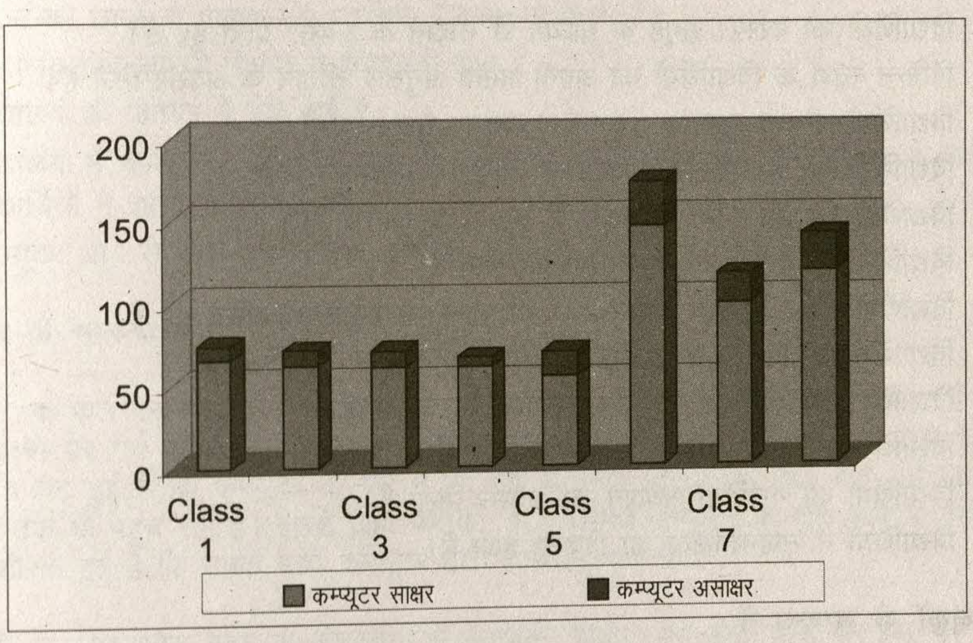
Year	
1999-2000	138
2000-2001	132
2001-2002	127
2002-2003	153
2003-2004	160
2004-2005	172



औसत उपस्थिति: जिले की शालाओं में उपस्थिति की वृद्धि के लिये विभिन्न प्रयासों के बाबजूद अपेक्षित सफलता प्राप्त नहीं होती थी, किन्तु हेडस्टार्ट कार्यक्रम के कारण सत्र 2002–03 से निरंतर वृद्धि की ओर है। सत्र 2003–04 में जन शिक्षा केन्द्र की उपस्थिति अन्य शालाओं की तुलना में 8 से 10 प्रतिशत अधिक है। इसी प्रकार सत्र 2004–05 में अन्य शालाओं की तुलना में उपस्थिति में वृद्धि 9 से 11 प्रतिशत अधिक है।

गुणवत्ता सुधारः हेडस्टार्ट कार्यक्रम के परिणामों के विश्लेषण से प्राप्त निष्कर्षो के अनुसार विद्यार्थियों में गुणात्मक सुधार आ रहा हैं, इस शाला में अन्य शालाओं की तुलना में "ए" ग्रेड प्राप्त विद्यार्थियों का प्रतिशत अधिक है। वर्तमान सत्र 2004–05 में इस दिशा में शिक्षकों की बैठक में विशिष्ट प्रयास किये गए हैं, जिससे गुणवत्ता सुधार की दिशा में अच्छे परिणाम प्राप्त हुये है साथ ही सभी विद्यार्थियों द्वारा कम्प्यूटर समर्थित शिक्षा योजना की सफलता प्राप्ति के लिये भी प्रयास किये गये है। कक्षानुसार कम्प्यूटर प्रयोग हेतु प्रत्येक विद्यार्थी को आत्मनिर्भर बनाया गया है, जिसके परिणाम स्वरूप इन विद्यार्थियों को 'कम्प्यूटर साक्षर' कहा जा सकता है।

सारणी 1: हेड स्टार्ट – विभिन्न कक्षाओं में



सारणी 2 : हेड स्टार्ट कक्षाओं में कम्प्यूटर साक्षरता

कक्षा	दर्ज संख्या	कम्प्यूटर साक्षर संख्या	कम्प्यूटर असाक्षर संख्या
पहली	74	65	09
दूसरी	71	61	10
तीसरी	70	60	10
चोथी	66	60	6
पॉचवीं	69	54	15
छठवीं	172	145	27
सातवीं	116	98	18
आठवीं	140	118	22

शिक्षकों के सामर्थ्य मे वृद्धिः हेडस्टार्ट कम्प्यूटर कार्यक्रम से प्राप्त परिणामों ने शिक्षकों में इस कार्यक्रम को आत्मसात करने की होड़ सी मची है। वर्तमान सत्र में शाला का प्रत्येक शिक्षक कम्प्यूटर प्रशिक्षित है, शिक्षक विषयानुसार अपने पाठों में कम्प्यूटर का नियमित प्रयोग करते हैं। मूल्याकंन क्रियाकलापों में भी कम्प्यूटर का प्रयोग किया जा रहा हैं ।

16.4 हेडस्टार्ट कार्यक्रम – निष्कर्ष

म.प्र. शासन द्वारा संचालित हेडस्टार्ट कार्यक्रम के प्रभाव व उपलब्धि के आधार पर सालीवाड़ा जन शिक्षा केन्द्र के संबंध में निम्न निष्कर्ष ध्यावत्य हैं।

विद्यार्थियों के सम्बन्ध में –

- विद्यार्थियों मे जिज्ञासा में वृद्धि हुई है।
- विद्यार्थियों को स्वयं करके सीखने के अवसर प्राप्त हुए हैं।
- विद्यार्थियों को परस्पर समूह के माध्यम से सीखने के अवसर प्राप्त हुए हैं।
- विभिन्न स्तरों के विद्यार्थियों को अपनी क्षमता अनुसार सीखने के अवसर मिलें हैं।
- विद्यार्थियों को स्व–मूल्यांकन करने के अवसर सुलभ हुए हैं।
- विद्यार्थियों को कम्प्यूटर के माध्यम से सीखने मे प्रोत्साहन मिला हैं।
- विद्यर्थियों को भय रहित वातावरण में सीखने के अवसर मिले हैं।
- विद्यार्थियों में निर्णय लेने की क्षमता विकसित हुई हैं।
- विंद्यर्थियों में क्रमबद्ध एवं व्यवस्थित कार्य करने की प्रवृत्ति विकसित हुई हैं।
- विद्यार्थियों को विज्ञान की प्रगति से सीधे जुडने का अवसर मिला हैं।
- विद्यार्थियो को स्वतंत्र लेखन का प्रोत्साहन प्राप्त हुआ हैं।
- विद्यार्थियो को खेल–खेल में सीखने का वातावरण मिला हैं।
- विद्यार्थियों को गलतियां सुधारने का अवसर मिला हैं।
- विद्याथियों में सृजनशीलता का विकास हुआ हैं।

शिक्षकों के सम्बन्ध में

- शिक्षक अधिक सामर्थ्यवान हुए हैं।
- शिक्षकों के आत्मविश्वास में वृद्धि हुई हैं।
- शिक्षकों को अपना पाठ स्वयं तैयार करने के अवसर प्राप्त हुए हैं।
- शिक्षकों को कठिन अवधारणाओं के सरल समाधान मिले हैं।
- सहायक शिक्षण सामग्री के रूप में कम्प्यूटर का उपयोग करने में शिक्षक समर्थ हुए हैं।
- शिक्षकों को परीक्षा परिणाम का विश्लेषण करने मे सहायता मिली।
- शिक्षकों को विद्यार्थियों का तुरंत मूल्यांकन करने के अवसर मिले।
- शाला में नामांकन, ठहराव एवं उपस्थिति तथा उपलब्धि स्तर में वृद्धि करने में शिक्षकों को सहयोग मिला।
- शिक्षकों को शाला एवं शैक्षिक जानकारी प्राप्त करने में सुविधा सुलभ हुई।
- शिक्षकों की सामाजिक प्रतिष्ठा में वृद्धि हुई है।
- शिक्षकों की कार्य क्षमता में वृद्धि हुई है।
- शिक्षकों को नवीन तकनीकी पद्धति का ज्ञान हुआ तथा वे नये क्षेत्र से जुडकर शिक्षा को प्रभावी ढंग से प्रस्तुत कर सकने मे समर्थ हुए हैं।
- शिक्षकों को शाला व कार्यालय सम्बन्धी कार्य में आसानी हुई हैं।
- शिक्षकों का आत्मविश्वास बढा है एवं उनकी झिझक दूर हुई है।

विद्यालय के सम्बन्ध में

- विद्यालय को शिक्षण उपकरण के रूप में सुलभ हुए हैं।
- विद्यालय के बच्चों का उपलब्धि स्तर बढ़ा और परीक्षा परिणाम में उन्नति हुई है।
- विद्यालय के परीक्षा परिणाम को विश्लेषण तथा ग्राफ द्वारा इसकी प्रस्तुति में सहायता मिली है।
- विद्यालय को शोध एवं नवाचार के अवसर प्राप्त हुए हैं।
- विद्यालय को बच्चों को चित्रकला सिखाने मे मदद मिली है।
- शाला का समाचार–पत्र निकलने से बच्चों में सृजनात्मकता का विकास हुआ है।
- शाला को छात्रों के प्रमाण–पत्र प्रकाशन में सहायता मिली है।
- विद्यालय प्रिंट सामग्री निर्माण में स्वावलंबी हुआ है।
- विद्यालय की प्रतिष्ठा में वृद्धि हुई है।
- विद्यालय में कम्प्यूटर आने से शाला के नामांकन में बढ़ोत्तरी हुई है। निकट के ग्रामों के विद्यार्थियों ने शाला में प्रवेश लिया है।
- कम्प्यूटर आने से शाला में नियमित उपस्थित बढ़ रही है।

समुदाय के सम्बन्ध में

हेडस्टार्ट के फलस्वरूप समुदाय का सरकारी शालाओं के प्रति जुड़ाव और विश्वास बढ़ा हैं। उन्हें अपने बच्चों पर गर्व होता है। वे उनके भविष्य के बारे मे काफी आगे बढ़कर सोचने लगे है। एक और बात यह हुई है कि कम्प्यूटर के बारे में की गई बातचीत और इसके द्वारा पाई गई जानकारी पालको तक भी पहुंच रही है। इससे जहॉ पालको की जिज्ञासा कम्प्यूटर के प्रति बढ़ी है, वही उन्हें यह खुशी भी हुई है कि उनके बच्चें कम्प्यूटर द्वारा अध्ययन कर रहे है।

प्रारंभ में जब माध्यमिक स्तर के विद्यालयों में कम्प्यूटर शिक्षण की बात चली तो इस पर सहज किसी को विश्वास नही हुआ था, किन्तु समुदाय और शिक्षकों के सहयोग से इस कार्यक्रम मे उल्लेखनीय उपलब्धि प्राप्त हुई है। विद्यार्थी, शिक्षक, विद्यालय तथा समुदाय शैक्षिक दृष्टि से इसका भरपूर लाभ उठा रहे है।

16.5 आगामी रणनीति

- हेडस्टार्ट कार्यक्रम को जनोपयोगी बनाने हेतु ''ज्ञानदूत'' योजना से जोड़कर विभिन्न शासकीय योजनाओं की जानकारी व आवेदन–पत्र आदि ग्रामवासियों को उपलब्ध करायें जाऐंगें।
- जन शिक्षा केन्द्र में इन्टरनेट की सुविधा उपलब्ध कराकर शिक्षकों कों अतिरिक्त विषय सामग्री उपलब्ध कराई जाऐगी।
- प्रत्येक कक्षा/पाठ के कठिन विषयवस्तु की शिक्षण योजना निर्माण का कार्य शिक्षकों द्वारा किया जाऐगा।
- उपचारात्मक/निदानात्मक अध्ययन के लिए कम्प्यूटर का उपयोग किया जावेगा।

16.6 संदर्भ

- राजीव गांधी शिक्षा मिशन उजाले की ओर (2003), जिला शिक्षा केन्द्र, जिला मण्डला।
- चौरासिया राधेश्याम (2000 तथा 2001) हेड स्टार्ट अध्ययन–मंडला जिले के संदर्भ में, मण्डला।

- राजीव गाँधी शिक्षा मिशन — हेड स्टार्ट : एक परिचय, भोपाल।
- राजीव गाँधी शिक्षा मिशन हेड स्टार्ट शैक्षिक कम्प्यूटर कार्यक्रम, भोपाल।
- राजीव गाँधी शिक्षा मिशन हेडस्टार्ट (कम्प्यूटर समर्थित शिक्षण योजना), भोपाल।
- राजीव गाँधी शिक्षा मिशन समाधान II (अकादमिक प्रशिक्षण मार्गदर्शिका), भोपाल।
- राजीव गाँधी शिक्षा मिशन (2000) हेड स्टार्ट (कम्प्यूटर से शिक्षा को पारस्परिक बनाने का कार्यक्रम), भोपाल।
- राजीव गाँधी शिक्षा मिशन संधान, राज्य शिक्षा केन्द्र, भोपाल।
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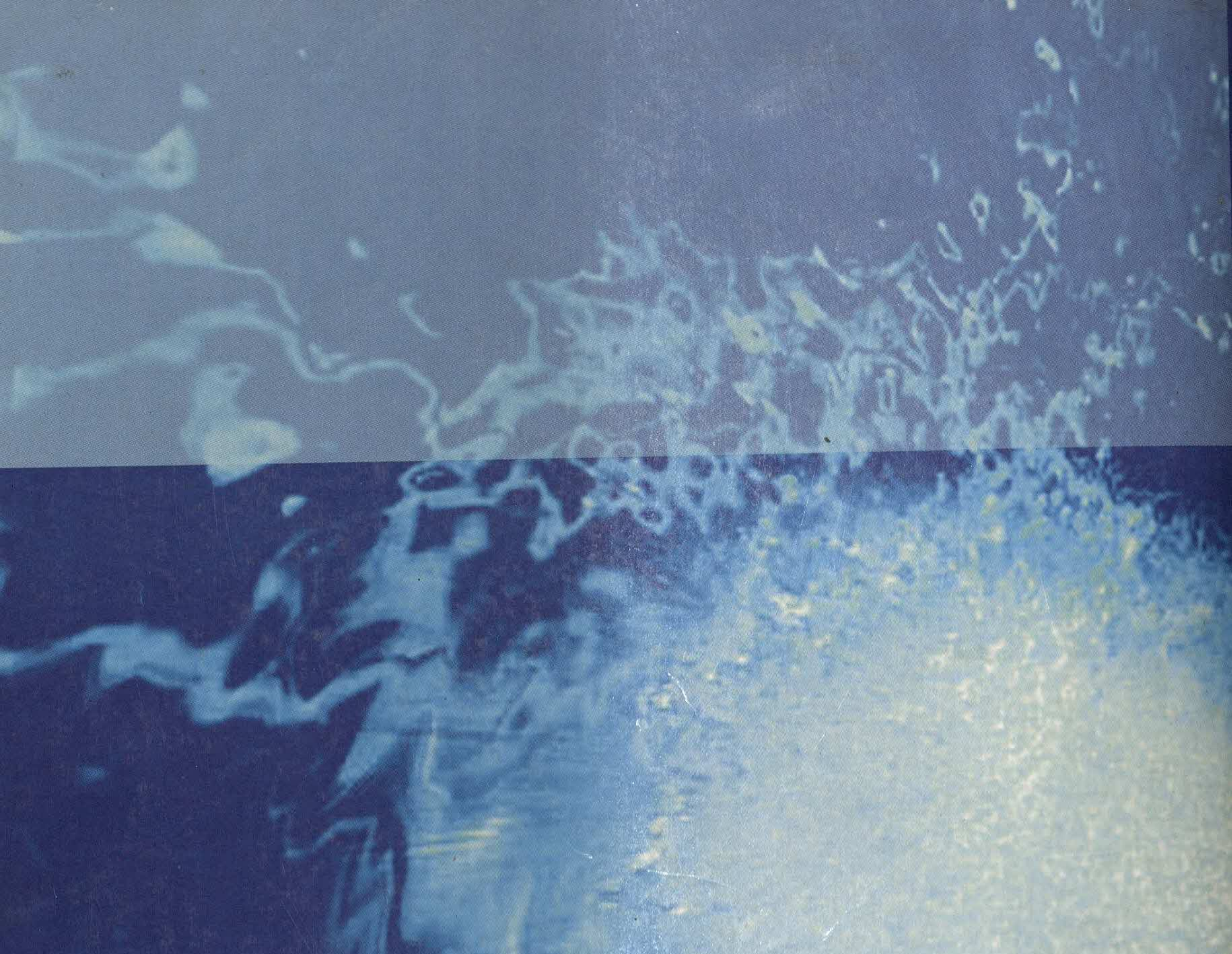

सर्व शिक्षा अभियान

सब पढ़ें सब बढ़ें

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